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The National Park Service Digital Geologic Map Model: transformation from paper to digital, featuring legends, cross sections, map notes and keyword searchability

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SUMMARY

Beginning in 1998, the National Park Service initiated a geologic resources inventory (GRI) to document and evaluate the geologic resources of about 265 National Park System units (national parks, monuments, recreational areas, historic sites, seashores, etc.). GRI workshops were held for units in Colorado (1998), Utah and Idaho (1999), and North Carolina (on-going in 2000). New, user-friendly GIS tools have been developed for digital geologic maps of Black Canyon of the Gunnison National Park, Curecanti National Recreation Area, Rocky Mountain National Park, and Craters of the Moon National Monument. Applications, including the NPS-developed ArcView Data Browser, graphical cross section viewer and legend text display tools are integrated with a standard geology-GIS model that is in development. The evolving geology-GIS model is based on the Washington State ArcInfo GIS data model (Harris 1998) that is being adapted for ArcView GIS and extended to include components of the North American Geologic Map Data Model (NADM), <http://geology.usgs.gov/dm/>

INTRODUCTION

Bedrock and surficial geologic maps and supporting information provide the foundation for studies of groundwater, geomorphology, soils, and environmental hazards. Geologic maps describe the underlying physical habitat of many natural systems and are an integral component of the physical science inventories stipulated by the National Park Service (NPS) in its Natural Resources Inventory and Monitoring Guideline (NPS-75) and the 1997 NPS Strategic Plan.

The NPS Geologic Resources Inventory (GRI) is a cooperative endeavor to implement a systematic, comprehensive inventory of the geologic resources in NPS units. Cooperators include the NPS Geologic

Resources Division, NPS Inventory and Monitoring (I&M) Program (Natural Resource Information Division), U.S. Geological Survey (USGS), and individual state geological surveys (currently Colorado, Utah, and North Carolina). The GRI for the 265 park units with significant natural resources consists of four main phases:

1.) "GRBib", compilation of a bibliography of geologic literature and maps;

2.) "scoping sessions", an on-site evaluation of park geologic maps, resources, and issues;

3.) digital geologic map products with accompanying supporting information; and

4.) a summary report with basic geologic information on hazards, issues, and existing data and studies.

STATUS OF GEOLOGIC RESOURCES INVENTORIES

The NPS Geologic Resources Division and Inventory and Monitoring Program sponsored a workshop in baseline geologic data in Denver, Colorado in fall 1997 to receive input from the NPS, USGS, state geological survey personnel, and cooperators on needed basic geologic data that Inventory and Monitoring Program could provide. At the meeting, Colorado, Utah, and North Carolina were chosen as pilot project states to maximize cooperation among the agencies and provide consistency in workshop planning. The group discussed and adopted the four main inventory phases that are reviewed briefly below.

Geologic Bibliographies

"GRBib", the bibliography of existing geologic maps and literature for each NPS unit in Colorado, Utah and North Carolina as well as many other parks is available on the internet (URL: <http://165.83.36.151/biblios/geobib.nsf>; LOGIN: "geobib read" PASSWORD: "anybody") and is also prepared as printable documents at <http://www2.nature.nps.gov/grd/geology/gri/products/geobib/>. Also, geologic index maps showing the location of associated geologic maps and their scale have been prepared for these same parks. In general, after map coverage for each park is determined, map products can be evaluated, and if needed, additional mapping projects identified and initiated.

Park Workshop Meetings

GRI Park Workshops (scoping sessions) were organized in 1998 (Colorado), 1999 (Utah and Idaho), 2000 (North Carolina), and now in 2001 at Carlsbad Caverns NP, Guadalupe Mountains NP and several parks in the National Capitol and Colorado Plataeu regions, including Grand Canyon NP, to evaluate each park's geologic resources. Park teams have evaluated existing maps for digital products and identified needed geologic mapping. New geologic mapping may be initiated on a case-by-case basis after careful evaluation of needs, costs, potential cooperators, and funding sources.

GRI cooperators are developing geologic-GIS standards to ensure uniform data quantity and quality for digital geologic maps. In addition to standardized data definitions and structure, NPS resource managers also need user-friendly GIS applications that allow the digital geologic map products to "look and feel" like the original published paper maps. Pilot digitization projects are providing additional information for the evolving NPS digital map standards.

Park workshops suggest several applications for park resource management from an enhanced understanding of the parks' geology. Examples include the use of geologic data to construct fire histories, to identify habitat for rare and endangered plant species, to identify areas with cultural and paleontological resource potential, and to locate potential hazards for park roads, facilities, and visitors. Digital geologic maps will enhance the ability to develop precise hazard and resource models in conjunction with other digital data.

Upon completion of an inventory in a park, the available geological literature and data from the NPS, USGS, state, and academic institutions will be documented in a summary report. The content, format, and database structure of such reports are still being developed.

Geologic Mapping and Digitizing Projects

The NPS I&M Program has cost-shared new geologic field mapping for Zion NP and Glen Canyon NRA with the Utah Geological Survey. Additional field mapping projects have been initiated or completed for the geologic maps for Bent's Old Fort NHS, Curecanti NRA, Florissant Fossil Beds NM, Capitol Reef NP, Cedar Breaks NM, Golden Spike NHS, Great Sand Dunes NP and Natural Bridges NM.

Digitization of geologic maps for Arches NP, Bent's Old Fort NHS, Black Canyon of the Gunnison NP, Colorado NM, Craters of the Moon NM, Curecanti NRA, Dinosaur NM, Florissant Fossil Beds NM, Great Sand Dunes NP, Hovenweep NM, Mesa Verde NP, Natural Bridges NM and Rocky Mountain NP has been completed, while digitization of geologic maps for Bryce Canyon NP, Capitol Reef NP, Cedar Breaks NM, Golden Spike NHS and Zion NP is currently in progress.

Preliminary plans are to initiate digitizing projects in 2001 for all Utah parks with completed paper geologic maps (Canyonlands NP and Timpanogos Cave NM).

The NPS Geologic Resources Inventory is being actively developed with the cooperation of USGS and state geological surveys. However, many opportunities for project collaboration may exist that have not yet been identified, and effective communication among cooperators is a key factor for success of the inventory. Another challenge of inventory planning is the development of digital map standards that are adaptable to diverse geological conditions but still provide quality, uniform products and firm guidance for map developers. Indeed, the diversity of geologic resources found in the National Park System will provide a continuing challenge for effective project management. The National Park Service has identified GIS and digital cartographic products as fundamental resource management tools, and the I&M Program and Geological Resources Division are developing an efficient inventory program to expedite the acquisition of digital geologic information for NPS units throughout the country.

GIS ISSUES AND IMPLEMENTATION - MAKING GEOLOGY "USER –FRIENDLY"

One of the unresolved issues facing developers of digital geologic maps and geology-GIS models is how to include map unit descriptions, supplemental explanatory text (references and map notes), geologic cross sections, and the variety of other printed information that occur on published maps. This issue is particularly important to the National Park Service because there are few geologists employed at parks, and resource managers rarely have the GIS and geologic expertise needed to develop a useful product from digital layers of polygons, lines, points, and associated tabular data. The overarching development goal of the NPS I&M Program is to produce digital products that are immediately useful to anyone familiar with their analog counterparts. For geologic maps, this means that the map unit legend must be sorted and shaded appropriately by geologic age and that all textual, graphical, and other information

from the published maps must be available interactively to the user. In short, the digital product must "look and feel" like its published source.

Since NPS resource managers use GIS as a tool in a wide array of collateral duties, the I&M Program is developing most digital products in ESRI (Environmental Systems Research Institute) ArcView GIS. ArcView interfaces effectively with other software running on the Microsoft Windows operating system. Also, using a variety of tools, including the Windows help software, a Microsoft Visual Basic graphics viewer program, the ArcView legend editor, and the Avenue script language, has allowed query and automatic display of published map information in the GIS.

Automating Map Unit Descriptions and Other Textual Information

In most GIS applications, the spatial database structure does not facilitate the use of voluminous textual data. For example, in ArcView, the database text fields only accommodate 254 characters (320 for INFO tables) which limits the ability to include lengthy map descriptions with the spatial data. Several options are available in ArcView to overcome this limitation including concatenating database fields, independent text files, linking to other database system files, and linking to a Microsoft Windows help file. After testing several options, NPS developers have been implementing the Windows help system.

This approach begins with the creation of the Help file table of contents (object table). The table includes a title, a listing of all source map units (sorted by geologic age), and a list of source map references and notes. Text descriptions of map units, paginated by geologic age, are entered next. For compiled geologic maps, maps produced from more than one source map, a unit's description often consists of multiple map unit descriptions. At the end, the source map references and notes text, also one per page, were entered. Help context IDs (HELP_ID), topic names, keywords, page numbers, and linking codes were then added to the footnotes of each page. The data was then saved as a rich text format (.rtf) file, and compiled into a Windows help file.

Once compiled, the Windows help file can be opened and used with almost any Microsoft Windows software. The table of contents has each map unit symbol and unit name "hot-linked" to the descriptions, and each description is hot-linked to the references and notes. Using the built-in Windows help tools, users can jump instantly to the table of contents, page through the age-sorted unit descriptions, search for keywords, or index the file and perform full-text searches of the entire file. The Black Canyon/Curecanti pilot project help file consists of more than 50 printed pages of information for more than 130 map units. Advantages of the Windows help file are that most text formatting, such as font, size, color, etc., are preserved in the final product, many graphics and tables are also supported, and the help system can be developed somewhat independently of the digital geologic map.

In ArcView GIS, three Avenue scripts were written to function with a toolbar button to automate the Windows help file and call unit descriptions interactively from the geologic map. The button tool is only active when the geology theme is turned on. The user selects the map unit help tool from the ArcView toolbar and clicks on the desired map unit to view the associated unit description. Using the map unit symbol (GLG_SYM, see data model below) and the corresponding help context ID (HELP_ID), the Avenue routine loads the Windows help file and pages to the map unit description. Thus, the map unit descriptions and other text are interactively available to the user of the digital map.

Automating the Geologic Cross Sections

Geologic cross sections are integral components of many published geologic maps and provide important spatial visualization tools to assist users with understanding the mapped geology. The I&M Program has developed a simple interactive system for displaying cross sections using ArcView and a Microsoft

Visual Basic (VB) graphics viewer program. The cross sections are scanned digital graphics files (JPEG format) that ArcView can load and display via system calls to the VB graphics viewer program. This allows the user to interactively select the cross section(s) to view. With projects such as the Black Canyon/Curecanti pilot, the ability to quickly view some 28 cross sections throughout the area is a powerful asset toward understanding the area's geology.

To prepare the cross sections for viewing, the graphics are first scanned at 300 dots-per-inch (DPI) and saved as a digital JPEG (.jpg extension) graphics file. The JPEG format was chosen to allow the graphics to be served and viewed over the Internet in the future. Once again, the 8.3 file naming convention is used to facilitate sharing across all platforms, and file names are based on the map series designation and the designated cross section on the map (e.g., "gq1516a.jpg" is the A-A' cross section on the Geologic Quadrangle Map GQ-1516).

Although ArcView and the Avenue language provide several ways to display graphics and images, ArcView's capabilities are inadequate for efficient viewing of cross sections that could be up to 6" x 48" in size. Therefore, a simple VB graphics viewer program was developed to provide this capability. The viewer displays the graphics at 100% with the ability to scroll from one end of the section to the other.

In ArcView GIS, three Avenue scripts were written to function with a toolbar button to automate the cross sections and call graphics files interactively from the geologic map. The button tool is only active when the cross section coverage/theme (CODESEC, see data model section below) is turned on. The user selects the Theme Manager cross section viewer tool from the ArcView toolbar and clicks on the desired cross section line displayed on the map. Using the cross section line and the corresponding filename, the Avenue script loads the graphics viewer and displays the selected section. Thus, the cross sections are interactively available to the user of the digital map.

GIS Map Unit Legend

In ArcView, theme legends can be customized to reproduce map feature symbols and colors of published source maps. To represent map features of a particular theme, an attribute field is selected in that theme's legend editor that relates map feature type with legend symbol type and color. In the NPS geology-GIS data model (presented below), the attribute field that denotes map feature type is typically either COV_TYPE for point themes or COV_LT for line themes, where COV represents the theme/coverage abbreviation. For polygon themes (themes typically representing geologic map units of areal extent), and also for point and line themes that represent point and line geologic map units, respectively, GLG_AGE_NO is the attribute field that relates feature type with symbol type (pattern) and color. As mentioned in the data dictionary section of the paper, the GLG_AGE_NO is a numeric attribute field also used to sort map units by geologic time.

For point symbols that indicate or represent directionality, ArcView also allows for those symbols to be aligned to their correct orientation using a second attribute or rotation field. For attitude observation points, (e.g. strike and dip of bedding, trend and plunge of inclusions), which is the only coverage presently in the data model that has oriented point symbols, the ATD_AV_ROT field designates the desired symbol rotation value.

When a theme legend is completed, it can be saved as an ArcView legend file (.avl extension). In the data model, a legend file is named as per the theme/coverage file name. By default in ArcView, if a legend file exists with the same file name as a theme, the legend file is automatically loaded when that coverage/theme is added to a view.

DRAFT NPS GEOLOGY-GIS DATA MODEL

As mentioned above, a standard geology-GIS data model has been developed for the National Park Service Geologic Resources Inventory (GRI). The model is based on ArcInfo and integrates with user-friendly ArcView GIS software. As per ArcView and dBase requirements, database field names have been limited to ten characters or less. In addition, although many modern operating systems allow for long file names, theme/coverage file names within the model adhere to the 8.3 file name convention. Typically, themes/coverages and associated table file names are seven characters in length. The use of only seven characters allows for an additional character to be appended to a coverage name for related look-up tables. For an NPS unit digital geologic map, the first four characters or prefix of a coverage name (CODE) are the NPS unit's alpha code. The next three characters (suffix) abbreviate the type of geologic coverage (COV). For INFO look-up tables associated with a coverage, an additional or eighth character, typically an integer, is appended to the theme/coverage name. An exception to the file naming convention presented above is arc/line map features of a polygon theme/coverage. ArcInfo allows for both arc/line and polygon labels to exist within the same (polygon) coverage, however, ArcView does not. Thus two themes are needed to present both the arc/line and polygon attribution of an ArcInfo polygon coverage in ArcView. For an ArcView arc/line theme associated with a polygon coverage, an 'A' (arc) is appended to the seven character polygon file name.

As with any digital map model, alterations and additional components, many derived from unique or uncommon map components, continue to advance and expand the model.

Geologic Themes

The NPS geology-GIS model's data themes or coverages are listed below.

Theme	Theme Type	Theme Description
CODEGLG/ CODEGLGA	poly/ line	Map units or geologic spatial data containing both polygon data describing the map units and linear data describing the interface between those units.
CODEGLN	line	Map units or geological spatial data represented as lines due to map scale limitations.
CODEGPT	point	Map units or geological spatial data represented as points due to map scale limitations.
CODEFLT	line	Faults.
CODEFLD	line	Linear fold axes/hingelines.
CODEATD	point	Attitude observation points.
CODEDAT	point	Age-date sample location points (fossil or radiometric age estimates).
CODEVNT	point	Volcanic vents, eruptive centers, features mapped as points.
CODEVLN	line	Linear volcanic crater, eruptive and flow features.
CODEDKE	line	Individual lithologic dikes.
CODEDKS/ CODEDKSA	poly/ line	Areas of lithologic dikes too numerous to map as individual segments (e.g. dike swarms).
CODEMIN	point	Mine and mining related features.
CODESEC	line	Cross section lines.

CODEASH/ CODEASHA	poly/ line	Volcanic ash map units containing both polygon data describing the map units and linear data describing the interface between those units.
CODEMET	line	Metamorphic grade boundaries.
CODEMOR	line	Linear glacial moraine features.
CODEJLN	line	Linear joint features.
CODELN#	line	Contour and other lines.
CODESPF	point	Geologic point data deemed sensitive by NPS Unit.
CODEUPF	point	Unique ‘non-sensitive’ geologic point data.
CODESUR/ CODESURA	poly/ line	Surficial geology consisting of both polygon data describing surficial map units and linear data describing the interface between those units.
CODEMUT	point	Measured unit thickness points.

# denotes a number assigned to theme/coverage name.

Theme/Coverage Data Dictionary

At present, all of the 22 themes/coverages presented in the data model have been evaluated and adapted into a coverage data dictionary. Of note, each theme/coverage has several attribute fields that ArcInfo adds automatically to a coverage. For polygon and point coverages, AREA, PERIMETER, CODECOV# and CODECOV-ID are added to the coverages polygon attribute table (.pat) . For arc/line coverages and polygon coverage arc/line attribution, FNODE#, TNODE#, LPOLY#, RPOLY#, CODECOV# and CODECOV-ID are added to the coverages arc attribute table (.aat). Two INFO look-up tables relating to map source information (CODEMAP) and additional lithology unit data (CODEGLG1) are also presented.

GEOLOGIC UNITS (CODEGLG)

Coverage consists of area geologic units.

SPATIAL THEME (FILENAME): Geologic Units (CODEGLG*)*
THEME DESCRIPTION: Polygon and Arc/line coverage(s)
TABLE COVERAGE/FILE NAME: CODEGLG.PAT (ArcInfo), CODEGLG.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 10

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEGLG_*	B (Binary)	4	5	-
CODEGLG_ID*	B (Binary)	4	5	-
GLG_IDX	I (Integer)	6	6	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Polygon Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

GLG_IDX A unique sequential identification number for each polygon. The field values ranges from 1 to n, where n is the number of polygons in the coverage/theme.

GLG_SYM Age-lithology symbol/code of geologic unit. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code of geologic unit. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions. A value of 99 is typically assigned to water areas.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map

projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Water Areas: Non-intermittent areas of water, area rivers, lakes, ponds and reservoir, are to be captured in the CODEGLG coverage/theme. If however, the 'underlying' geologic unit or units can be visually discerned on the source map, then these areas are not to be captured in the CODEGLG coverage/theme. Intermittent bodies are not to be captured unless the 'underlying' geologic unit or units can not be visually discerned on the source map. Captured water areas are denoted in the GLG_SYM and USGS_SYM fields (see field descriptions above) with the text 'WATER', and a GLG_AGE_NO (see field description above) value of 99.

2.) Fault Zones: Areas mapped as fault zones are to be captured in the CODEGLG coverage/theme. These areas are denoted in the GLG_SYM and USGS_SYM fields (see field descriptions above) with the text 'FAULTZONE', and a GLG_AGE_NO (see field description above) value of 98.

GEOLOGIC UNIT CONTACTS/MAP BOUNDARY (CODEGLG/CODEGLGA)

Coverage consists of geologic contact arcs and map boundary.

SPATIAL THEME (FILENAME): Geologic Map Unit Boundaries/Contacts (CODEGLG/ArcInfo), (CODEGLGA/ArcView)
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEGLG.AAT (ArcInfo), CODEGLGA.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 11

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEGLGA_*	B (Binary)	4	5	-
CODEGLGA_ID*	B (Binary)	4	5	-
GLGCNT_IDX	I (Integer)	6	6	-
GLGCNT_TYP	I (Integer)	3	3	-
FLTCNT	C (Character)	1	1	-
GMAP_ID	I (Integer)	6	6	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

GLGCNT_IDX A unique sequential identification number for each contact/map boundary arc. The field values ranges from 1 to n, where n is the number of arcs in the coverage/theme.

GLGCNT_TYPE A code value that designates the positional accuracy and/or concealment of a contact/map boundary arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

GLGCNT_TYP Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried
9	gradational
10	quadrangle boundary
11	extent/map boundary

GLGCNT_TYP Code Value List (cont.)

12	water/shoreline
13	water/shoreline, approximate
14	ice/glacial
15	ice/glacial approximate

FLTCNT Designates geologic contact arcs that are also fault arcs. Contact arc segments that are also fault arcs (FLTCNT = 'Y') are present in both the geologic unit (CODEGLG/CODEGLGA) and fault (CODEFLT) themes.

FLTCNT Code List

Y	Yes, the contact is also a fault
N	No, the contact is not also a fault

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

SPECIAL COVERAGE GUIDELINES:

1.) Contact/Fault Arcs in Multiple Themes: Contact arcs that are also fault arcs (FLTCNT = 'Y', see FLTCNT field description above) are present in both the geologic contact/boundaries (CODEGLG/CODEGLGA) and fault (CODEFLT) themes.

2.) Contact/Fault Arc Directionality: Contact/fault arcs (FLTCNT = 'Y', see FLTCNT field description above) are captured with the down-thrown fault block, if applicable, on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). Thus, the down-thrown fault-block should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

LINEAR GEOLOGIC UNITS (CODEGLN)

Coverage consists of linear geologic units.

SPATIAL THEME (FILENAME): Linear Geologic Units (CODEGLN*)*
THEME DESCRIPTION: Polygon and Arc/line coverage(s)
TABLE COVERAGE/FILE NAME: CODEGLN.PAT (ArcInfo), CODEGLN.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 15

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEGLN_*	B (Binary)	4	5	-
CODEGLN_ID*	B (Binary)	4	5	-
GLN_IDX	I (Integer)	6	6	-
GLNCNT_TYP	I (Integer)	2	2	-
FLTCNT	C (Character)	1	1	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

GLN_IDX A unique sequential identification number for each linear geologic unit arcs. The field values ranges from 1 to n, where n is the number of arcs in the coverage/theme.

GLNCNT_TYP A code value used to designate the positional accuracy and/or concealment of a linear geologic unit arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

GLNCNT_TYP Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred location
8	inferred, queried

GLNCNT_TYP Code Value List (cont.)

12	water/shoreline
13	water/shoreline, approximate
14	ice/glacial
15	ice/glacial

FLTCNT Designates linear geologic unit arcs that are along fault lines. Linear geologic unit arcs that are also faults arcs (FLTCNT = 'Y') are present in both the linear geologic unit (CODEGLN) and fault (CODEFLT) themes.

FLTCNT Code List

Y	Yes, the linear geologic unit arc is also afault arc
N	No, the linear geologic unit arc is not also a fault arc

GLG_SYM Age-lithology symbol/code of linear geologic unit. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code of linear geologic unit. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each linear geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Linear Geologic Unit/Fault Arc Directionality: Linear geologic unit arcs that are along fault lines (FLTCNT = 'Y', see FLTCNT field description above) are captured with the down-thrown fault block, if applicable, on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). The down-thrown fault-block should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

POINT GEOLOGIC UNITS (CODEGPT)

Coverage consists of point geologic units.

SPATIAL THEME (FILENAME): Point Geologic Units (CODEGPT)
THEME DESCRIPTION: Point coverage
TABLE COVERAGE/FILE NAME: CODEGPT.PAT (ArcInfo), CODEGPT.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 11

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEGPT_*	B (Binary)	4	5	-
CODEGPT_ID*	B (Binary)	4	5	-
GPT_IDX	I (Integer)	6	6	-
GPTCNT_TYP	I (Integer)	2	2	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Point Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

GPT_IDX A unique sequential identification number for each point. The field values ranges from 1 to n, where n is the number of point features in the coverage/theme.

GPTCNT_TYP A code value used to designate the positional accuracy and/or concealment of a point geologic unit. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

GPTCNT_TYP Code Value List

1 known or certain
2 approximate
3 concealed
4 queried
5 approximate, queried
6 concealed, queried
7 inferred
8 inferred, queried

GLG_SYM Age-lithology symbol/code of a point geologic unit. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code of a point geologic unit. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each point geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

None.

FAULTS (CODEFLT)

Coverage consists of geologic fault lines.

SPATIAL THEME (FILENAME): Geologic Faults (CODEFLT*)*
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEFLT.AAT (ArcInfo), CODEFLT.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 16

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEFLT_*	B (Binary)	4	5	-
CODEFLT_ID*	B (Binary)	4	5	-
FLT_IDX	I (Integer)	6	6	-
FLT_SEG_N	I (Integer)	3	3	-
FLT_SEG_T	I (Integer)	2	2	-
FLT_TYPE	I (Integer)	2	2	-
FLT_LT	I (Integer)	3	3	-
FLTCNT	C (Character)	1	1	-
FLT_NM	C (Character)	60	60	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

FLT_IDX A unique sequential identification number for each fault. A fault can be comprised of one or more continuous arc segments. The field values ranges from 1 to n, where n is the number of faults in the coverage/theme.

FLT_SEG_N A sequential number assigned to each arc segment of a fault. All arc segments of a fault must be continuous and have a common FLT_IDX number. Segment numbers are assigned starting at the 'starting end' of a fault, defined as the end arc of a fault where the right fault block moved downward relative to the left fault block condition (as per fault special coverage digitization requirements), if valid (see Special Coverage Guidelines below). A value of 1 is assigned to the 'starting' fault arc segment. The next adjacent arc is assigned a value of 2 and so on to the nth arc segment, where n is the total number of arc segments that comprise that fault. For faults where the down-thrown block can not be determined or is not applicable, either end of the fault will suffice for the 'starting' arc. A value of 0 may be is assigned to all arcs if 'conditions' justify so.

FLT_SEG_T A code value that designates the positional accuracy and/or concealment of a fault arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

FLT_SEG_T Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried

FLT_TYPE A code value used to differentiate fault type, as determined by fault separation/offset and/or displacement. Refer to the geologic map legend for graphical representation of faults as well as the accompanying map notes and/or report on fault types. In addition, fault arcs that contact a map edge may have additional information pertinent to that fault on an adjacent geologic map.

FLT_TYPE Code Value List

1	thrust fault
2	reverse fault
3	low angle normal fault
4	normal fault
5	right lateral strike-slip fault
6	left lateral strike-slip fault
7	reverse right lateral strike-slip fault
8	reverse left lateral strike-slip fault
9	normal right lateral strike-slip fault
10	normal left lateral strike-slip fault
11	unknown offset/displacement
12	landslide scarp
13	detachment fault
14	high angle fault
15	right lateral fault, vertical displacement/offset unknown
16	left lateral fault, vertical displacement/offset unknown
17	gravity slide plane
18	overturned thrust fault

FLT_LT A code value for graphical line type representation of a fault arc segment. The code value is derived from the segment type (FLT_SEG_T , see field description above) and fault type (FLT_TYPE, see field description above). The code value is calculated by multiplying the FLT_TYPE value by 10, then adding the FLT_SEG_T value to the sum.

FLT_LT Code Value List

11	thrust fault, known or certain
12	thrust fault, approximate
13	thrust fault, concealed
14	thrust fault, queried
15	thrust fault, approximate, queried
16	thrust fault, concealed, queried
17	thrust fault, inferred

FLT_LT Code Value List (cont.)

18	thrust fault, inferred, queried
21	reverse fault, known or certain
22	reverse fault, approximate
23	reverse fault, concealed
24	reverse fault, queried
25	reverse fault, approximate, queried
26	reverse fault, concealed, queried
27	reverse fault, inferred
28	reverse fault, inferred, queried
31	low angle normal fault, known or certain
32	low angle normal fault, approximate
33	low angle normal fault, concealed
34	low angle normal fault, queried
35	low angle normal fault, approximate, queried
36	low angle normal fault, concealed, queried
37	low angle normal fault, inferred
38	low angle normal fault, inferred, queried
41	normal fault, known or certain
42	normal fault, approximate
43	normal fault, concealed
44	normal fault, queried
45	normal fault, approximate, queried
46	normal fault, concealed, queried
47	normal fault, inferred
48	normal fault, inferred, queried
51	right lateral strike-slip fault, known or certain
52	right lateral strike-slip fault, approximate
53	right lateral strike-slip fault, concealed
54	right lateral strike-slip fault, queried
55	right lateral strike-slip fault, approximate, queried
56	right lateral strike-slip fault, concealed, queried
57	right lateral strike-slip fault, inferred
58	right lateral strike-slip fault, inferred, queried
61	left lateral strike-slip fault, known or certain
62	left lateral strike-slip fault, approximate
63	left lateral strike-slip fault, concealed
64	left lateral strike-slip fault, queried
65	left lateral strike-slip fault, approximate, queried
66	left lateral strike-slip fault, concealed, queried
67	left lateral strike-slip fault, inferred
68	left lateral strike-slip fault, inferred, queried
71	reverse right lateral strike-slip fault, known or certain
72	reverse right lateral strike-slip fault, approximate
73	reverse right lateral strike-slip fault, concealed
74	reverse right lateral strike-slip fault, queried
75	reverse right lateral strike-slip fault, approximate, queried
76	reverse right lateral strike-slip fault, concealed, queried
77	reverse right lateral strike-slip fault, inferred
78	reverse right lateral strike-slip fault, inferred, queried
81	reverse left lateral strike-slip fault, known or certain

FLT_LT Code Value List (cont.)

82	reverse left lateral strike-slip fault, approximate
83	reverse left lateral strike-slip fault, concealed
84	reverse left lateral strike-slip fault, queried
85	reverse left lateral strike-slip fault, approximate, queried
86	reverse left lateral strike-slip fault, concealed, queried
87	reverse left lateral strike-slip fault, inferred
88	reverse left lateral strike-slip fault, inferred, queried
91	normal right lateral strike-slip fault, known or certain
92	normal right lateral strike-slip fault, approximate
93	normal right lateral strike-slip fault, concealed
94	normal right lateral strike-slip fault, queried
95	normal right lateral strike-slip fault, approximate, queried
96	normal right lateral strike-slip fault, concealed, queried
97	normal right lateral strike-slip fault, inferred
98	normal right lateral strike-slip fault, inferred, queried
101	normal left lateral strike-slip fault, known or certain
102	normal left lateral strike-slip fault, approximate
103	normal left lateral strike-slip fault, concealed
104	normal left lateral strike-slip fault, queried
105	normal left lateral strike-slip fault, approximate, queried
106	normal left lateral strike-slip fault, concealed, queried
107	normal left lateral strike-slip fault, inferred
108	normal left lateral strike-slip fault, inferred, queried
111	fault, unknown offset, known or certain
112	fault, unknown offset, approximate
113	fault, unknown offset, concealed
114	fault, unknown offset, queried
115	fault, unknown offset, approximate, queried
116	fault, unknown offset, concealed, queried
117	fault, unknown offset, inferred
118	fault, unknown offset, inferred, queried
121	landslide scarp, known or certain
122	landslide scarp, approximate
123	landslide scarp, concealed
124	landslide scarp, queried
125	landslide scarp, approximate, queried
126	landslide scarp, concealed, queried
127	landslide scarp, unknown offset, inferred
128	landslide scarp, unknown offset, inferred, queried
131	detachment fault, known or certain
132	detachment fault, approximate
133	detachment fault, concealed
134	detachment fault, queried
135	detachment fault, approximate, queried
136	detachment fault, concealed, queried
137	detachment fault, unknown offset, inferred
138	detachment fault, unknown offset, inferred, queried
141	high angle fault, known or certain
142	high angle fault, approximate
143	high angle fault, concealed

FLT_LT Code Value List (cont.)

144 high angle fault, queried
145 high angle fault, aprroximate, queried
146 high angle fault, concealed, queried
147 high angle fault, inferred
148 high angle fault, inferred, queried
151 right lateral fault, vertical displacement/offset unknown, known or certain
152 right lateral fault, vertical displacement/offset unknown, approximate
153 right lateral fault, vertical displacement/offset unknown, concealed
154 right lateral fault, vertical displacement/offset unknown, queried
155 right lateral fault, vertical displacement/offset unknown, approximate, queried
156 right lateral fault, vertical displacement/offset unknown, concealed, queried
157 right lateral fault, vertical displacement/offset unknown inferred
158 right lateral fault, vertical displacement/offset unknown, inferred, queried
161 left lateral fault, vertical displacement/offset unknown, known or certain
162 left lateral fault, vertical displacement/offset unknown, approximate
163 left lateral fault, vertical displacement/offset unknown, concealed
164 left lateral fault, vertical displacement/offset unknown, queried
165 left lateral fault, vertical displacement/offset unknown, approximate, queried
166 left lateral fault, vertical displacement/offset unknown, concealed, queried
167 left lateral fault, vertical displacement/offset unknown inferred
168 left lateral fault, vertical displacement/offset unknown, inferred, queried
171 gravity slide plane, known or certain
172 gravity slide plane, approximate
173 gravity slide plane, concealed
174 gravity slide plane, queried
175 gravity slide plane, approximate, queried
176 gravity slide plane, concealed, queried
177 gravity slide plane, inferred
178 gravity slide plane, inferred, queried
181 overturned thrust fault, known or certain
182 overturned thrust fault, approximate
183 overturned thrust fault, concealed
184 overturned thrust fault, queried
185 overturned thrust fault, approximate, queried
186 overturned thrust fault, concealed, queried
187 overturned thrust fault, inferred
188 overturned thrust fault, inferred, queried

FLTCNT Designates fault arc segments that are geologic contact arcs between different geologic units. Fault arc segments that are contact arcs (FLTCNT = 'Y') are present in both the fault (CODEFLT) and geologic unit (CODEGLG) themes.

FLTCNT Code List

Y Yes, the fault is also a geologic contact arc
N No, the fault is not also a geologic contact arc

FLT_NM The name of the fault. Fault arcs without an assigned name have a value of 'NA'. Fault arcs that have the same identification number (FLT_IDX, see field description above) should have the same fault name. Fault arcs that contact a map edge may have a fault name indicated on an adjacent geologic map.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Fault/Contact Arcs in Multiple Themes: Fault arcs that are also geologic contacts between different geologic units or are also linear geologic units (FLTCNT = 'Y', see FLTCNT field description above) are present in both the fault (CODEFLT) and geology (CODEGLG) themes, or the fault (CODEFLT) and linear geologic (CODEGLN) themes, respectively.

2.) Fault Arc Directionality: Fault arcs are captured with the down-thrown fault block, if applicable, on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). The down-thrown fault-block should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

FOLDS (CODEFLD)

Coverage consists of geologic fold and hinge lines.

SPATIAL THEME (FILENAME): Geologic Folds (CODEFLD*)*
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEFLD.AAT (ArcInfo), CODEFLD.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 15

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEFLD_*	B (Binary)	4	5	-
CODEFLD_ID*	B (Binary)	4	5	-
FLD_IDX	I (Integer)	6	6	-
FLD_SEG_N	I (Integer)	3	3	-
FLD_SEG_T	I (Integer)	2	2	-
FLD_TYPE	I (Integer)	2	2	-
FLD_LT	I (Integer)	3	3	-
FLD_NM	C (Character)	60	60	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

FLD_IDX A unique sequential identification number for each fold. A fold axes can be comprised of one or more continuous arc segments. The field values ranges from 1 to n, where n is the number of folds in the coverage/theme.

FLD_SEG_N A sequential number assigned to each arc segment of a fold. All arc segments of a fold must be continuous and have a common FLD_IDX number. Segment numbers are assigned starting at one end' of a fold. A value of 1 is assigned to one end of the fold. The next adjacent arc is assigned a value of 2 and so on to the nth arc segment, where n is the total number of arc segments that comprise that fold axis. A value of 0 may be is assigned to all arcs if 'conditions' justify so.

FLD_SEG_T A code value that designates the positional accuracy and/or concealment of a fold axis arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

FLD_SEG_T Code Value List

1	known or certain
2	Approximate

FLD_SEG_T Code Value List (cont.)

3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred location
8	inferred, queried

FLD_TYPE A code value used to differentiate fold type. Refer to the geologic map legend for graphical representation of fold axes as well as the accompanying map notes and/or report on fold types. In addition, fold arcs that contact a map edge may have additional information pertinent to that fold on an adjacent geologic map.

FLD_TYPE Code Value List

1	anticline
2	syncline
3	overturned anticline
4	overturned syncline
5	monocline, anticlinal bend
6	monocline, synclinal bend
7	antiform
8	synform
9	overturned antiform
10	overturned synform
11	neutral fold with vertical axis
12	asymmetrical anticline
13	asymmetrical syncline
14	monocline
15	fold hinge length exposed at surface
16	hinge line

FLD_LT A code value for graphical line type representation of a fold arc segment. The code value is derived from the segment type (FLD_SEG_T , see field description above) and fold type (FLD_TYPE, see field description above). The code value is calculated by multiplying the FLD_TYPE value by 10, then adding the FLD_SEG_T value to the sum.

FLD_LT Code Value List

11	anticline, known or certain
12	anticline, approximate
13	anticline, concealed
14	anticline, queried
15	anticline, approximate, queried
16	anticline, concealed, queried
19	anticline, inferred
20	anticline, inferred, queried
21	syncline, known or certain
22	syncline, approximate
23	syncline, concealed
24	syncline, queried
25	syncline, approximate, queried
26	syncline, concealed, queried

FLD_LT Code Value List (cont.)

27	syncline, inferred
28	syncline, inferred, queried
31	overturned anticline, known or certain
32	overturned anticline, approximate
33	overturned anticline, concealed
34	overturned anticline, queried
35	overturned anticline, approximate, queried
36	overturned anticline, concealed, queried
37	overturned anticline, inferred
38	overturned anticline, inferred, queried
41	overturned syncline, known or certain
42	overturned syncline, approximate
43	overturned syncline, concealed
44	overturned syncline, queried
45	overturned syncline, approximate, queried
46	overturned syncline, concealed, queried
47	overturned syncline, inferred
48	overturned syncline, inferred, queried
51	monocline, anticlinal bend, known or certain
52	monocline, anticlinal bend, approximate
53	monocline, anticlinal bend, concealed
54	monocline, anticlinal bend, queried
55	monocline, anticlinal bend, approximate, queried
56	monocline, anticlinal bend, concealed, queried
57	monocline, anticlinal bend, inferred
58	monocline, anticlinal bend, inferred, queried
61	monocline, synclinal bend, known or certain
62	monocline, synclinal bend, approximate
63	monocline, synclinal bend, concealed
64	monocline, synclinal bend, queried
65	monocline, synclinal bend, approximate, queried
66	monocline, synclinal bend, concealed, queried
67	monocline, synclinal bend, inferred
68	monocline, synclinal bend, inferred, queried
71	antiform, known or certain
72	antiform, approximate
73	antiform, concealed
74	antiform, queried
75	antiform, approximate, queried
76	antiform, concealed, queried
77	antiform, inferred
78	antiform, inferred, queried
81	synform, known or certain
82	synform, approximate
83	synform, concealed
84	synform, queried
85	synform, approximate, queried
86	synform, concealed, queried
87	synform, inferred
88	synform, inferred, queried

FLD_LT Code Value List (cont.)

91	overturned antiform, known or certain
92	overturned antiform, approximate
93	overturned antiform, concealed
94	overturned antiform, queried
95	overturned antiform, approximate, queried
96	overturned antiform, concealed, queried
97	overturned antiform, inferred
98	overturned antiform, inferred, queried
101	overturned synform, known or certain
102	overturned synform, approximate
103	overturned synform, concealed
104	overturned synform, queried
105	overturned synform, approximate, queried
106	overturned synform, concealed, queried
107	overturned synform, inferred
108	overturned synform, inferred, queried
111	neutral fold with vertical axis, known or certain
112	neutral fold with vertical axis, approximate
113	neutral fold with vertical axis, concealed
114	neutral fold with vertical axis, queried
115	neutral fold with vertical axis, approximate, queried
116	neutral fold with vertical axis, concealed, queried
117	neutral fold with vertical axis, inferred
118	neutral fold with vertical axis, inferred, queried
121	asymmetrical anticline, known or certain
122	asymmetrical anticline, approximate
123	asymmetrical anticline, concealed
124	asymmetrical anticline, queried
125	asymmetrical anticline, approximate, queried
126	asymmetrical anticline, concealed, queried
127	asymmetrical anticline, inferred
128	asymmetrical anticline, inferred, queried
131	asymmetrical syncline, known or certain
132	asymmetrical syncline, approximate
133	asymmetrical syncline, concealed
134	asymmetrical syncline, queried
135	asymmetrical syncline, approximate, queried
136	asymmetrical syncline, concealed, queried
137	asymmetrical syncline, inferred
138	asymmetrical syncline, inferred, queried
141	monocline, known or certain
142	monocline, approximate
143	monocline, concealed
144	monocline, queried
145	monocline, approximate, queried
146	monocline, concealed, queried
147	monocline, inferred
148	monocline, inferred, queried
151	fold hinge length exposed at surface, known or certain
152	fold hinge length exposed at surface, approximate

FLD_LT Code Value List (cont.)

153 fold hinge length exposed at surface, concealed
154 fold hinge length exposed at surface, queried
155 fold hinge length exposed at surface, approximate, queried
156 fold hinge length exposed at surface, concealed, queried
157 fold hinge length exposed at surface, inferred
158 fold hinge length exposed at surface, inferred, queried
161 hinge line, known or certain
162 hinge line, approximate
163 hinge line, concealed
164 hinge line, queried
165 hinge line, approximate, queried
166 hinge line, concealed, queried
167 hinge line, inferred
168 hinge line, inferred, queried

FLD_NM The name of the fold. Fold arcs without an assigned name have a value of 'NA'. Fold arcs that have the same identification number (FLD_IDX, see field description above) should have the same fold name. Fold arcs that contact a map edge may have a fold name indicated on an adjacent geologic map.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Plunging Fold Lines - Fold arcs that end with a plunge arrow should extend to the 'tip' of the plunge arrowhead symbol.

ATTITUDE POINTS (CODEATD)

Coverage consists of attitude observations points as well as fault and fold related type and directionality symbology.

SPATIAL THEME (FILENAME): Geologic Attitude Points (CODEATD*)*
THEME DESCRIPTION: Point coverage
TABLE COVERAGE/FILE NAME: CODEATD.PAT (ArcInfo), CODEATD.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 11

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEATD_*	B (Binary)	4	5	-
CODEATD_ID*	B (Binary)	4	5	-
ATD_IDX	I (Integer)	6	6	-
ATD_TYPE	I (Integer)	2	2	-
ATD_ST	I (Integer)	3	3	-
ATD_DP	I (Integer)	4	4	-
ATD_AV_ROT	I (Integer)	3	3	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Point Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

ATD_IDX A unique sequential identification number for each point. The field values ranges from 1 to n, where n is the number of point features in the coverage/theme.

ATD_TYPE A code value used to indicate the type of attitude observation or map attitude symbology depiction. Refer to the geologic map legend for graphical representation of attitude features.

ATD_TYPE Code Value List

1 strike and dip of beds
2 strike and dip of overturned beds
3 strike of vertical beds
4 horizontal beds*%
5 strike and dip of beds, tops known from sedimentary structures
6 strike and dip of overturned beds, tops known from sedimentary structures
7 strike and dip of beds, tops known from sedimentary structures, dot indicates top of beds
8 strike and dip of variable bedding
9 approximate strike and dip of beds
10 strike of beds, dip amount unspecified
11 strike of overturned beds, dip amount unspecified

ATD_TYPE Code Value List (cont.)

12	strike of beds, tops known from sedimentary structures, amount of dip unspecified
13	strike of variable bedding, dip amount unspecified
14	approximate strike of beds, dip amount unspecified
15	strike of variable vertical beds
16	strike and dip of bedding in phacoids in shear zones
17	strike and dip of bedding in phacoids in shear zones, tops known from sedimentary structures
18	strike of bedding in phacoids in shear zones, tops known from sedimentary structures, amount of dip unspecified
19	crumpled, plicated, crenulated, or undulatory beds and average dip
20	strike and dip of foliation and bedding
21	strike of vertical foliation and bedding
22	strike and dip of variable bedding and foliation
23	strike and dip of foliation
24	strike of vertical foliation
25	horizontal foliation*%
26	strike and dip of variable foliation
27	strike of foliation, dip amount unspecified
28	strike of variable foliation, vertical dip
29	strike and dip of joints
30	strike of joints, dip amount unspecified
31	strike of vertical joints
32	bearing and plunge of lineation
33	vertical lineation
34	horizontal lineation
35	bearing of lineation, plunge unspecified
36	strike and dip of cleavage
37	strike of cleavage, dip unspecified
38	bearing and plunge of minor antiform
39	bearing and plunge of minor synform
40	bearing of minor antiform, plunge amount unspecified
41	bearing of minor synform, plunge amount unspecified
42	fold plunge arrow head*
43	trend of oriented inclusions
44	strike and dip of flow layering
45	strike of vertical flow layering
46	direction of movement of landslide, mudflows and debris flows*#
47	fault dip amount*
48	fault up ‘U’ indicator*#
49	fault down ‘D’ indicator*#
50	fault down-side (bar and ball) indicator*#
51	vertical fault plane
52	trend of oriented inclusions#
53	drag fold, hinge line of small fold#
54	dip of contact*
55	general trend of contorted foliation
56	general trend of contorted vertical foliation
57	monocline symbol*#
58	anticline symbol*#

ATD_TYPE Code Value List (cont.)

59	syncline symbol*#
60	overturned anticline symbol*#
61	overturned syncline symbol*#
62	monocline, anticlinal bend symbol*#
63	monocline, synclinal bend symbol*#
64	antiform symbol*#
65	synfrom symbol*#
66	overturned antiform symbol*#
67	overturned synform symbol*#
68	monocline, maximum inflection of dip*#
69	strike and dip of foliation, folded
70	strike and dip of foliation with inclusions
71	strike of vertical foliation with inclusions
72	dip of overturned contact*
73	neutral fold with vertical fold axis#
74	asymmetrical anticline symbol*#
75	asymmetrical syncline symbol*#
76	fault displacement amount*%
77	dip of inclined feature*
78	dip of slickensides*
79	fault block movement direction arrow (right-lateral)*#
80	fault block movement direction arrow (left-lateral)*#
81	dome symbol*#
82	basin symbol*#
83	strike and dip of axial plane of fold
84	strike of vertical axial plane of minor fold
85	bearing and plunge of minor fold axis, fold type unspecified
86	bearing of horizontal minor fold axis, fold type unspecified*
87	component of dip*
88	strike of approximately vertical joints
89	strike and dip of beds, inferred

Attitude types with non-applicable strike/trend value are denoted with an asterisk (*), (see ATD_ST field description below). Attitude types with non-applicable dip/plunge value are denoted with a number or pound sign (#),(see ATD_DP field description below). Attitude types with a non-applicable rotation value (see ATD_AV_ROT field description below) are denoted with a percent sign (%),

ATD_ST The azimuth of strike (planar measurements) or trend (linear measurements). The value ranges from 0 (north) clockwise to 359. For strike measurements, the azimuth value is determined using the right-rule method, dip direction 90^0 clockwise from the strike azimuth. For attitude types with non-applicable strike/trend value, horizontal attitude observations or fault and fold point symbology, denoted in the ATD_TYPE Code Value List with an asterisk (*), (see ATD_TYPE field description above) a value of 999 is assigned.

ATD_DP The dip (planar measurements) or plunge (linear measurements) value associated with the attitude observation. The value ranges from 0 (horizontal) to 90 (vertical). For attitude types with non-applicable dip/plunge value, fault and fold point symbology, or non-determined or undeterminable attitude types, denoted in the ATD_DP Code Value List with a pound sign (number; #), (see ATD_TYPE field description above), a value of 99 is assigned. If a range of dip or plunge measurements is noted, enter the average of the value range, rounding fractions up.

ATD_AV_ROT A value that rotates an attitude point feature symbol in ArcView so that the feature symbol corresponds to the source map's representation of that feature. The rotation value is dependent on the attitude type (see ATD_TYPE field description above), the ArcView symbology and default or non-rotated symbol orientation, and the orientation of the map feature. The value ranges from 0 (non-rotated) to 359. Attitude types with a non-applicable rotation value are assigned a rotation value of 0 (non-rotated), and are denoted in the ATD_TYPE Code Value List with a percent sign (%), (see ATD_TYPE field description above). For attitude types with an applicable rotation value, the value can either be determined from a strike/trend azimuth value if known or determinable and applicable, by measuring the feature's attitude or orientation directly from the source map, or by entering a rotation value so that the feature's symbol representation rotates to correspond with the source map's image representation of that feature. (see ATD_ST field description above, and Special Guidelines Section (#2) below).

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Point Placement: For a good number of attitude point types, placement of a digitized point is at the center of the point's graphical symbol. However, for many attitude points that represent fault or fold type, directionality and/or attitude, point placement should be on the related fault or fold arc/line.

2.) Feature Symbol Rotation and Strike/Trend Values: The rotation value used to correctly orient many attitude feature symbols in ArcView, as mentioned in the ATD_AV_ROT field description presented above, is dependent on the type of attitude feature, the symbology used to represent that feature in ArcView, and the default or non-rotated orientation of that symbol. For many of these features, a directional component or azimuth, either strike or trend, measured at the locality is conveyed in the graphical orientation of that feature, and is therefore directly related to a value that rotates the orientation of that feature's symbol. Thus, it is possible to determine the ATD_ST value from the ATD_AV_ROT field, and vice versa. Formulas to calculate the ATD_ST value from the ATD_AV_ROT value, and vice versa, are presented in an appendix file, ATDAVROT.DOC.

AGE-DATE POINTS (CODEDAT)

Coverage consists of paleontological and radiometric age-dating localities.

SPATIAL THEME (FILENAME): Age-Date Points (CODEDAT*)*
THEME DESCRIPTION: Point coverage
TABLE COVERAGE/FILE NAME: CODEDAT.PAT (ArcInfo), CODEDAT.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 13

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEDAT_*	B (Binary)	4	5	-
CODEDAT_ID*	B (Binary)	4	5	-
DAT_IDX	I (Integer)	6	6	-
DAT_CD	I (Integer)	2	2	-
DAT_AGE	C (Character)	100	100	-
DAT_NOTE	C (Character)	254	254	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Point Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

DAT_IDX A unique sequential identification number for each point. The field values ranges from 1 to n, where n is the number of point features in the coverage/theme.

DAT_CD A code value used to indicate the type of age-dating technique.

DAT_CD Code Value List

1	radiometric
2	paleontological

DAT_AGE Relative or absolute age of age-date sample.

DAT_NOTE Text notes and remarks about age-date sample.

GLG_SYM Age-lithology symbol/code of geologic unit age-date sample was taken/derived from. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code geologic unit age-date sample was taken/derived from. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each point geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool. Each digital map has one Help File (CODEHLP.HLP) with information for all themes produced from the source map as per the NPS GIS-Geology Data Model.

SPECIAL COVERAGE GUIDELINES:

1.) Point Placement: For age-date localities, placement of a digitized point is at the center of the point's graphical symbol.

VOLCANIC POINT FEATURES (CODEVNT)

Coverage consists of non-sensitive volcanic features mapped as point localities.

SPATIAL THEME (FILENAME): Volcanic Point Features (CODEVNT*)*
THEME DESCRIPTION: Point coverage
TABLE COVERAGE/FILE NAME: CODEVNT.PAT (ArcInfo), CODEVNT.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 11

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEVNT_*	B (Binary)	4	5	-
CODEVNT_ID*	B (Binary)	4	5	-
VNT_IDX	I (Integer)	6	6	-
VNT_TYPE	I (Integer)	2	2	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Point Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

VNT_IDX A unique sequential identification number for each point feature. The field values ranges from 1 to n, where n is the number of point features in the coverage/theme.

VNT_TYPE A code value used to indicate the type of volcanic feature.

VNT_TYPE Code Value List

1	cone
2	spatter cone
3	rootless vent
4	natural arch
5	natural bridge
6	natural window
7	lava tree
8	treemold

GLG_SYM Age-lithology symbol/code of geologic unit volcanic point feature is located within. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code of geologic unit volcanic point feature is located within. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each point geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Point Placement: For a good number of volcanic 'point' features, placement of a digitized point is at the center of the point's graphical symbol.

2.) Sensitive Volcanic Point Features: Volcanic 'point' features deemed sensitive by an NPS unit are captured in the sensitive point (CODESPF) coverage/theme. Sensitivity of a feature is determined by the NPS unit. Typical sensitive volcanic point features include cave openings, hollows, skylights and tunnels.

LINEAR VOLCANIC FEATURES (CODEVLN)

Coverage consists of linear volcanic line features.

SPATIAL THEME (FILENAME): Linear Volcanic Features (CODEVLN)
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEVLN.AAT (ArcInfo), CODEVLN.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 18

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEVLN_*	B (Binary)	4	5	-
CODEVLN_ID*	B (Binary)	4	5	-
VLN_IDX	I (Integer)	6	6	-
VLN_SEG_N	I (Integer)	3	3	-
VLN_SEG_T	I (Integer)	2	2	-
VLN_TYPE	I (Integer)	2	2	-
VLN_LT	I (Integer)	3	3	-
VLN_NM	C (Character)	60	60	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

VLN_IDX A unique sequential identification number for each linear volcanic arc. A feature can be comprised of one or more continuous arc segments. The field values ranges from 1 to n, where n is the number of linear volcanic feature arcs in the coverage/theme.

VLN_SEG_N A sequential number assigned to each segment of a linear volcanic feature. All arc segments of a linear volcanic feature must be continuous and have a common VLN_IDX number. Segment numbers are assigned starting at a one end. A value of 1 is assigned to the 'starting' arc segment. The next adjacent arc is assigned a value of 2 and so on to the nth arc segment, where n is the total number of arc segments that comprise the continuos linear volcanic feature. A value of 0 may be is assigned to all arcs if 'conditions' justify so.

VLN_SEG_T A code value that designates the positional accuracy and/or concealment of a linear volcanic feature. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

VLN_SEG_T Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried

VLN_TYPE A code value used to differentiate the type of linear volcanic feature. Refer to the geologic map legend for graphical representation of linear volcanic feature as well as the accompanying map notes and/or report. In addition, linear volcanic feature arcs that contact a map edge may have additional information pertinent to that feature on an adjacent geologic map.

VLN_TYPE Code Value List

1	crater
2	pit crater
3	eruptive fissure
4	non-eruptive fissure
5	lava channel
6	lava pond
7	flow ridge, furrow, crack
8	flow direction line

VLN_LT A code value for graphical line type representation of a linear volcanic feature arc segment. The code value is derived from the segment type (VLN_SEG_T , see field description above) and linear volcanic feature type (VLN_TYPE, see field description above). The code value is calculated by multiplying the VLN_TYPE value by 10, then adding the VLN_SEG_T value to the sum.

VLN_LT Code Value List

11	crater, known or certain
12	crater, approximate
13	crater, concealed
14	crater, queried
15	crater, approximate, queried
16	crater, concealed, queried
17	crater, inferred
18	crater, inferred, queried
21	pit crater, known or certain
22	pit crater, approximate
23	pit crater, concealed
24	pit crater, queried
25	pit crater, approximate, queried
26	pit crater, concealed, queried
27	pit crater, inferred
28	pit crater, inferred, queried

VLN_LT Code Value List (cont.)

31	eruptive fissure, known or certain
32	eruptive fissure, approximate
33	eruptive fissure, concealed
34	eruptive fissure, queried
35	eruptive fissure, approximate, queried
36	eruptive fissure, concealed, queried
37	eruptive fissure, inferred
38	eruptive fissure, inferred, queried
41	non-eruptive fissure, known or certain
42	non-eruptive fissure, approximate
43	non-eruptive fissure, concealed
44	non-eruptive fissure, queried
45	non-eruptive fissure, approximate, queried
46	non-eruptive fissure, concealed, queried
47	non-eruptive fissure, inferred
48	non-eruptive fissure, inferred, queried
51	lava channel, known or certain
52	lava channel, approximate
53	lava channel, concealed
54	lava channel, queried
55	lava channel, approximate, queried
56	lava channel, concealed, queried
57	lava channel, inferred
58	lava channel, inferred, queried
61	lava pond, known or certain
62	lava pond, approximate
63	lava pond, concealed
64	lava pond, queried
65	lava pond, approximate, queried
66	lava pond, concealed, queried
67	lava pond, inferred
68	lava pond, inferred, queried
71	flow ridge, furrow, crack, known or certain
72	flow ridge, furrow, crack, approximate
73	flow ridge, furrow, crack, concealed
74	flow ridge, furrow, crack, queried
75	flow ridge, furrow, crack, approximate, queried
76	flow ridge, furrow, crack, concealed, queried
77	flow ridge, furrow, crack, inferred
78	flow ridge, furrow, crack, inferred, queried
81	flow direction line, known or certain
82	flow direction line, approximate
83	flow direction line, concealed
84	flow direction line, queried
85	flow direction line, approximate, queried
86	flow direction line, concealed, queried
87	flow direction line, crack, inferred
88	flow direction line, inferred, queried
91	crest line of crater, known or certain
92	crest line of crater, approximate

VLN_LT Code Value List (cont.)

93	crest line of crater, concealed
94	crest line of crater, queried
95	crest line of crater, approximate, queried
96	crest line of crater, concealed, queried
97	crest line of crater, crack, inferred
98	crest line of crater, inferred, queried
101	crest line of crater, known or certain
102	crest line of crater, approximate
103	crest line of crater, concealed
104	crest line of crater, queried
105	crest line of crater, approximate, queried
106	crest line of crater, concealed, queried
107	crest line of crater, crack, inferred
108	crest line of crater, inferred, queried

VLN_NM The name of linear volcanic feature. Volcanic linear feature arcs without an assigned name have a value of 'NA' Linear volcanic feature arcs that have the same identification number (VLN_IDX, see field description above) should have the same name. Linear volcanic feature arcs that contact a map edge may have a name indicated on an adjacent geologic map.

GLG_SYM Age-lithology symbol/code of volcanic unit associated with linear volcanic feature. Common to all arc segments with the same VLN_IDX number (see field description above). The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code of volcanic unit associated with linear volcanic feature. Common to all arc segments with the same VLN_IDX number (see field description above). The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions. A value of 99 is typically assigned to water areas.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Linear Volcanic Feature Arc Directionality: For flow direction lines (VLN_TYPE of 8, see field description above) arc segments are to be captured in the direction of flow, as indicated on the source map. Thus, the starting or from node (FNODE_) should be the 'starting point' of the arc. For crater lines (VLN_TYPE of 1), pit crater lines (VLN_TYPE of 2), flow ridge lines (VLN_TYPE of 7) and crest line of crater (VLN_TYPE of 10) arc segments are to be captured with the down-direction or slope on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). Thus, the down-direction or slope should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

LINEAR DIKES (CODEDKE)

Coverage consists of geologic linear dikes.

SPATIAL THEME (FILENAME): Geologic Linear Dikes (CODEDKE*)*
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEDKE.AAT (ArcInfo), CODEDKE.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 17

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEDKE_*	B (Binary)	4	5	-
CODEDKE_ID*	B (Binary)	4	5	-
DKE_IDX	I (Integer)	6	6	-
DKE_SEG_N	I (Integer)	3	3	-
DKE_SEG_T	I (Integer)	2	2	-
DKE_NM	C (Character)	60	60	-
DKEFLT	C (Character)	1	1	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

DKE_IDX A unique sequential identification number for each linear dike. A linear dike can be comprised of one or more continuous arc segments. The field values ranges from 1 to n, where n is the number of linear dikes in the coverage/theme.

DKE_SEG_N A sequential number assigned to each arc segment of a linear dike. All arc segments of a linear dike must be continuous and have a common DKE_IDX number. Segment numbers are assigned starting at one end of the dike arc. A value of 1 is assigned to the 'starting' linear dike arc segment. The next adjacent arc is assigned a value of 2 and so on to the nth arc segment, where n is the total number of arc segments that comprise that linear dike. For linear dikes where the down-thrown block can not be determined or is not applicable, either end of the linear dike will suffice for the 'starting' arc. A value of 0 may be is assigned to all arcs if 'conditions' justify so.

DKE_SEG_T A code value that designates the positional accuracy and/or concealment of a linear dike arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

DKE_SEG_T Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried

DKE_NM The name of the linear dike. Linear dike arcs without an assigned name have a value of 'NA'. Linear dikes arcs that have the same identification number (DKE_IDX, see field description above) should have the same linear dike name.

DKEFLT Designates linear dike arc segments that are mapped along geologic faults. Linear dikes arc segments that are also mapped has fault arcs (DKEFLT = 'Y') are present in both the linear dike (CODEDKE) and fault (CODEFLT) themes.

DKEFLT Code List

Y	Yes, the linear dike is also a geologic contact between different geologic units
N	No, the linear dike is not also a geologic contact between different geologic units

GLG_SYM Age-lithology symbol/code of geologic unit. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code of geologic unit. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each point geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Linear Dikes/Fault Arcs in Multiple Themes: Linear dikes arcs that are also fault arcs (DKEFLT = 'Y', see DKEFLT field description above) are present in both the linear dike (CODEDKE) and fault (CODEFLT) themes.

2.) Linear Dike/Fault Arc Directionality: Linear dike arcs that are mapped along faults (DKEFLT = 'Y', see DKEFLT field description above) are captured with the down-thrown fault block, if applicable, on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). The down-thrown fault-block should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

DIKE SWARM AREAS (CODEDKS)

Coverage consists of areas of dikes too numerous to map as individual segments e.g. (dike swarms).

SPATIAL THEME (FILENAME): Dike Swarms (CODEDKS*)*
THEME DESCRIPTION: Polygon and Arc/line coverage(s)
TABLE COVERAGE/FILE NAME: CODEDKS.PAT (ArcInfo), CODEDKS.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 10

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEDKS_*	B (Binary)	4	5	-
CODEDKS_ID*	B (Binary)	4	5	-
DKS_IDX	I (Integer)	6	6	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Polygon Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

DKS_IDX A unique sequential identification number for each polygon. The field values ranges from 1 to n, where n is the number of polygons in the coverage/theme.

GLG_SYM Age-lithology symbol/code of dikes. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below). A value of 'NA' is assigned to polygons that are not dike swarm areas (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

USGS_SYM USGS age-lithology symbol/code of dikes. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above). A value of 'NA' is assigned to polygons that are not dike swarm areas (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions. A value of 999 is assigned to polygons that are not dike swarm areas (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map

features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Non-Applicable Polygons (Doughnut Holes): Polygons within the CODEDKS coverage/theme that are bounded by one or more dike swarm polygons and are not dike swarm areas (i.e. doughnut holes) are assigned a GLG_SYM, USGS_SYM and HELP_ID field (see field descriptions above) value of 'NA' and a GLG_AGE_NO field (see field description above) value of 999.

DIKE SWARM CONTACTS/BOUNDARIES (CODEDKS/CODEDKSA)

Coverage consists of contact/boundary arcs that define areas with dikes too numerous to map as individual segments e.g. (dike swarms).

SPATIAL THEME (FILENAME): Dike Swarm Contacts/Boundaries (CODEDKS/ArcInfo), (CODEDKSA/ArcView)
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEDKS.AAT (ArcInfo), CODEDKSA.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 11

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEDKSA_*	B (Binary)	4	5	-
CODEDKSA_ID*	B (Binary)	4	5	-
DKSCNT_IDX	I (Integer)	6	6	-
DKSCNT_TYP	I (Integer)	3	3	-
DKSFLT	C (Character)	1	1	-
GMAP_ID	I (Integer)	6	6	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

DKSCNT_IDX A unique sequential identification number for each contact/boundary arc. The field values ranges from 1 to n, where n is the number of arcs in the coverage/theme.

DKSCNT_TYPE A code value that designates the positional accuracy and/or concealment of a contact/boundary arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

DKSCNT_TYP Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried
9	gradational
10	quadrangle boundary
11	extent/map boundary
12	water/shoreline
13	water/shoreline, approximate
14	ice/glacial
15	ice/glacial approximate

DKSFLT Designates dike swarm contact/boundary arcs that are also fault arcs. Contact/boundary arc segments that are also fault arcs (DKSFLT = 'Y') are present in both the area dike swarm (CODEDKS/CODEDKSA) and fault (CODEFLT) themes.

DKSFLT Code List

Y	Yes, the contact/boundary <u>is</u> also a fault
N	No, the contact/boundary is <u>not</u> also a fault

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

SPECIAL COVERAGE GUIDELINES:

1.) Contact/Fault Arcs in Multiple Themes: Contact/boundary arcs that are also fault arcs (DKSFLT = 'Y', see DKSFLT field description above) are present in both the geologic contact/boundary (CODEDKS/CODEDKSA) and fault (CODEFLT) themes.

2.) Contact/Fault Arc Directionality: Contact/boundary/fault arcs (DKSFLT = 'Y', see DKSFLT field description above) are captured with the down-thrown fault block, if applicable, on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). Thus, the down-thrown fault-block should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

MINE AND MINING RELATED FEATURES (CODEMIN)

Coverage consists of mine and mine related features mapped as points.

SPATIAL THEME (FILENAME): Geologic Attitude Points (CODEMIN*)*
THEME DESCRIPTION: Point coverage
TABLE COVERAGE/FILE NAME: CODEMIN.PAT (ArcInfo), CODEMIN.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 10

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEMIN_*	B (Binary)	4	5	-
CODEMIN_ID*	B (Binary)	4	5	-
MIN_IDX	I (Integer)	6	6	-
MIN_TYPE	I (Integer)	3	3	-
MIN_NOTE	C (Character)	254	254	-
ID_CODE	C (Character)	50	50	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Point Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

MIN_IDX A unique sequential identification number for mine and mine related features. The field values ranges from 1 to n, where n is the number of mine and mine related features in the coverage/theme.

MIN_TYPE A code value used to indicate the type of mine or mine related feature. Refer to the geologic map legend for graphical representation of mine and mine related features.

MIN_TYPE Code Value List

1	prospect
2	adit
3	shaft
4	mine
5	open pit mine
6	gravel pit
7	borrow pit
8	mine related structure (e.g. mill, cable tower, water tank etc.)
9	caved adit
10	caved shaft

MIN_TYPE Code Value List (cont.)

11	quarry
12	well
13	oil well
14	oil and gas well
15	gas well
16	water-injection well
17	gas-injection well
18	dry hole

MIN_NOTE Text note on mine and mine related feature (e.g. mine name, structure type, commodity mined etc.).

ID_CODE Unique feature identification number from NPS Geologic Resources Division (GRD) Abandoned Mineral Lands (AML) Database.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Point Placement: For a good number of mine and mine related features, placement of a digitized point is at the center of the point's graphical symbol. However, for some features, adits and caved adits, the point is placed at the intersection of lines that comprise the feature's graphic symbol. For area mines, placement of the digitized point should be in the approximated center of the area.

GEOLOGIC CROSS SECTION LINES (CODESEC)

Coverage consists of geologic cross section lines.

SPATIAL THEME (FILENAME): Geologic Cross Section Lines(CODESEC*)*
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODESEC.AAT (ArcInfo), CODESEC.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 15

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODESEC_*	B (Binary)	4	5	-
CODESEC_ID*	B (Binary)	4	5	-
SEC_IDX	I (Integer)	6	6	-
SEC_ABV_O	C (Character)	6	6	-
SEC_ABV	C (Character)	6	6	-
SEC_FILE	C (Character)	60	60	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

SEC_IDX A unique sequential identification number for each cross section line. The field values ranges from 1 to n, where n is the number of cross section lines in the coverage/theme.

SEC_ABV_O Original cross section abbreviation (i.e. A-A') on source map.

SEC_ABV Cross section abbreviation (i.e. A-A') on compiled NPS unit digital geologic map.

SEC_FILE Cross section graphic (.jpg) directory path and 8.3 file name (root:\code\data\nrdata\geology\gis\graphics\map series number-cross section letter.jpg, ex. c:\dino\data\nrdata\geology\gis\graphics\i584a.jpg). The cross section graphic can be viewed using the NPS ArcView Theme Manager and a Visual Basic (VB) graphics viewer program. The SEC_FILE value is 'passed' to the graphics viewer program via a Theme Manager tool. The 'passed' SEC_FILE value then directs to the graphics viewer program to the directory path and file name of the selected cross section image.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF

tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

None.

GEOLOGIC ASH UNITS (CODEASH)

Coverage consists of area volcanic ash units.

SPATIAL THEME (FILENAME): Volcanic Ash Units (CODEASH*)*
THEME DESCRIPTION: Polygon and Arc/line coverage(s)
TABLE COVERAGE/FILE NAME: CODEASH.PAT (ArcInfo), CODEASH.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 10

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEASH_*	B (Binary)	4	5	-
CODEASH_ID*	B (Binary)	4	5	-
ASH_IDX	I (Integer)	6	6	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Polygon Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

ASH_IDX A unique sequential identification number for each polygon. The field values ranges from 1 to n, where n is the number of polygons in the coverage/theme.

GLG_SYM Age-lithology symbol/code of ash unit. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below). A value of 'NA' is assigned to areas within the coverage/theme that are not areas of volcanic ash (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

USGS_SYM USGS age-lithology symbol/code of ash unit. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above). A value of 'NA' is assigned to areas within the coverage/theme that are not areas of volcanic ash (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

GLG_AGE_NO Number used to age-sort geologic units, from youngest (low) to oldest (high). Values assigned to each geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions. A value of 999 is assigned to polygons within the coverage/theme that are not areas of volcanic ash (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Non-Applicable Polygons (Doughnut Holes): Polygons within the CODEASH coverage/theme that are bounded by one or more geologic ash polygons and are not geologic ash units (i.e. doughnut holes) are assigned a GLG_SYM, USGS_SYM and HELP_ID field (see field descriptions above) value of 'NA' and a GLG_AGE_NO field (see field description above) value of 999.

GEOLOGIC ASH CONTACTS/BOUNDARIES (CODEASH/CODEASHA)

Coverage consists of geologic ash contact/boundary arcs.

SPATIAL THEME (FILENAME): Geologic Ash Unit Boundaries/Contacts (CODEASH/ArcInfo), (CODEASHA/ArcView)
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEASH.AAT (ArcInfo), CODEASHA.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 11

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEASHA_*	B (Binary)	4	5	-
CODEASHA_ID*	B (Binary)	4	5	-
ASHCNT_IDX	I (Integer)	6	6	-
ASHCNT_TYP	I (Integer)	3	3	-
FLTCNT	C (Character)	1	1	-
GMAP_ID	I (Integer)	6	6	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

ASHCNT_IDX A unique sequential identification number for each ach contact/map boundary arc. The field values ranges from 1 to n, where n is the number of arcs in the coverage/theme.

ASHCNT_TYPE A code value that designates the positional accuracy and/or concealment of an ash contact/map boundary arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

ASHCNT_TYP Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried
9	gradational
10	quadrangle boundary
11	extent/map boundary

ASHCNT_TYP Code Value List (cont.)

12	water/shoreline
13	water/shoreline, approximate
14	ice/glacial
15	ice/glacial approximate

FLTCNT Designates ash contact arcs that are also fault arcs. Contact arc segments that are also fault arcs (FLTCNT = 'Y') are present in both the ash contact (CODEASH/CODEASHA) and fault (CODEFLT) themes.

FLTCNT Code List

Y	Yes, the contact is also a fault
N	No, the contact is not also a fault

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

SPECIAL COVERAGE GUIDELINES:

1.) Contact/Fault Arcs in Multiple Themes: Ash contact arcs that are also fault arcs (FLTCNT = 'Y', see FLTCNT field description above) are present in both the ash contact/boundaries (CODEASH/CODEASHA) and fault (CODEFLT) themes.

2.) Contact/Fault Arc Directionality: Ash contact/fault arcs (FLTCNT = 'Y', see FLTCNT field description above) are captured with the down-thrown fault block, if applicable, on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). Thus, the down-thrown fault-block should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

METAMORPHIC GRADE BOUNDARIES (CODEMET)

Coverage consists of metamorphic grade boundaries.

SPATIAL THEME (FILENAME): Metamorphic Grade Boundaries (CODEMET)
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEMET.AAT (ArcInfo), CODEMET.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 15

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEMET_*	B (Binary)	4	5	-
CODEMET_ID*	B (Binary)	4	5	-
MET_IDX	I (Integer)	6	6	-
MET_SEG_N	I (Integer)	3	3	-
MET_SEG_T	I (Integer)	2	2	-
MET_TYPE	I (Integer)	2	2	-
MET_LT	I (Integer)	3	3	-
MET_NOTE	C (Character)	254	254	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

MET_IDX A unique sequential identification number for each arc. A metamorphic grade boundary can be comprised of one or more continuous arc segments. The field values ranges from 1 to n, where n is the number of metamorphic grade boundary in the coverage/theme.

MET_SEG_N A sequential number assigned to each arc segment of a metamorphic grade boundary. All arc segments of a metamorphic grade boundary must be continuous and have a common MET_IDX number. Segment numbers are assigned starting at one end' of an arc. A value of 1 is assigned to one end of the metamorphic grade boundary arc. The next adjacent arc is assigned a value of 2 and so on to the nth arc segment, where n is the total number of arc segments that comprise that metamorphic grade boundary. A value of 0 may be is assigned to all arcs if 'conditions' justify so.

MET_SEG_T A code value that designates the positional accuracy and/or concealment of a metamorphic grade boundary arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

MET_SEG_T Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried

MET_TYPE A code value used to differentiate metamorphic grade boundary type. Refer to the geologic map legend for graphical representation of metamorphic grade boundaries as well as the accompanying map notes and/or report on fold types.

MET_TYPE Code Value List

1	metamorphic grade boundary

MET_LT A code value for graphical line type representation of a metamorphic grade boundary arc segment. The code value is derived from the segment type (MET_SEG_T , see field description above) and metamorphic grade boundary type (MET_TYPE, see field description above). The code value is calculated by multiplying the MET_TYPE value by 10, then adding the MET_SEG_T value to the sum.

MET_LT Code Value List

11	metamorphic grade boundary, known or certain
12	metamorphic grade boundary, approximate
13	metamorphic grade boundary, concealed
14	metamorphic grade boundary, queried
15	metamorphic grade boundary, approximate, queried
16	metamorphic grade boundary, concealed, queried
17	metamorphic grade boundary, inferred
18	metamorphic grade boundary, inferred, queried

MET_NOTE Text notes and remarks on metamorphic grade boundary.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

None.

LINEAR GLACIAL FEATURES (CODEMOR)

Coverage consists of linear glacial features.

SPATIAL THEME (FILENAME): Linear Glacial Features (CODEMOR*)*
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEMOR.AAT (ArcInfo), CODEMOR.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 18

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEMOR_*	B (Binary)	4	5	-
CODEMOR_ID*	B (Binary)	4	5	-
MOR_IDX	I (Integer)	6	6	-
MOR_SEG_N	I (Integer)	3	3	-
MOR_SEG_T	I (Integer)	2	2	-
MOR_TYPE	I (Integer)	2	2	-
MOR_LT	I (Integer)	3	3	-
MOR_NOTE	C (Character)	100	100	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

MOR_IDX A unique sequential identification number for each arc. A linear glacial feature can be comprised of one or more continuous arc segments. The field values ranges from 1 to n, where n is the number of linear glacial feature in the coverage/theme.

MOR_SEG_N A sequential number assigned to each arc segment of a linear glacial feature. All arc segments of a linear glacial feature must be continuous and have a common MOR_IDX number.

Segment numbers are assigned starting at one end' of an arc. A value of 1 is assigned to one end of the linear glacial feature arc. The next adjacent arc is assigned a value of 2 and so on to the nth arc segment, where n is the total number of arc segments that comprise that linear glacial feature. A value of 0 may be is assigned to all arcs if 'conditions' justify so.

MOR_SEG_T A code value that designates the positional accuracy and/or concealment of a linear glacial feature arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

MOR_SEG_T Code Value List

1	known or certain
3	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried

MOR_TYPE A code value used to differentiate linear glacial feature type. Refer to the geologic map legend for graphical representation of metamorphic grade boundaries as well as the accompanying map notes and/or report on fold types.

MOR_TYPE Code Value List

1	moraine crest
2	glacial movement direction line
3	ridge crest of fluted landform or drumlin
4	glacial meltwater channel
5	crevasse

MOR_LT A code value for graphical line type representation of a linear glacial feature arc segment. The code value is derived from the segment type (MOR_SEG_T , see field description above) and linear glacial feature type (MOR_TYPE, see field description above). The code value is calculated by multiplying the MOR_TYPE value by 10, then adding the MOR_SEG_T value to the sum.

MOR_LT Code Value List

11	moraine crest, known or certain
12	moraine crest, approximate
13	moraine crest, concealed
14	moraine crest, queried
15	moraine crest, approximate, queried
16	moraine crest, concealed, queried
17	moraine crest, inferred
18	moraine crest, inferred, queried
21	glacial movement direction line, known or certain
22	glacial movement direction line, approximate
23	glacial movement direction line, concealed
24	glacial movement direction line, queried
25	glacial movement direction line, approximate, queried
26	glacial movement direction line, concealed, queried
27	glacial movement direction line, inferred

MOR_LT Code Value List (cont.)

28	glacial movement direction line, inferred, queried
31	ridge crest of fluted landform or drumlin, known or certain
32	ridge crest of fluted landform or drumlin, approximate
33	ridge crest of fluted landform or drumlin, concealed
34	ridge crest of fluted landform or drumlin, queried
35	ridge crest of fluted landform or drumlin, approximate, queried
36	ridge crest of fluted landform or drumlin, concealed, queried
37	ridge crest of fluted landform or drumlin, inferred
38	ridge crest of fluted landform or drumlin, inferred, queried
41	glacial meltwater channel, known or certain
42	glacial meltwater channel, approximate
43	glacial meltwater channel, concealed
44	glacial meltwater channel, queried
45	glacial meltwater channel, approximate, queried
46	glacial meltwater channel, concealed, queried
47	glacial meltwater channel, inferred
48	glacial meltwater channel, inferred, queried
51	crevasse, known or certain
52	crevasse, approximate
53	crevasse, concealed
54	crevasse, queried
55	crevasse, approximate, queried
56	crevasse, concealed, queried
57	crevasse, inferred
58	crevasse, inferred, queried

MOR_NOTE Text notes and remarks on linear glacial feature.

GLG_SYM Age-lithology symbol/code of geologic unit associated with linear glacial feature. Common to all arc segments with the same MOR_IDX number (see field description above). The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code of volcanic unit associated with linear glacial feature. Common to all arc segments with the same MOR_IDX number (see field description above). The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each point geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Glacial Feature Arc Directionality: Some glacial feature arcs may represent or depict directions of glacial ice movement (MOR_TYPE = 2) or glacial meltwater channel flows (MOR_TYPE = 4) or slope, crevasses (MOR_TYPE = 5). Arcs that represent directionality of movement or flow are to be captured starting at the 'up end' of the feature, as indicated on the source map. Thus, the starting or from node (FNODE_) should be the 'starting point' of the arc. For arcs with a slope or down-direction, the slope or down-direction should be on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). Thus, the slope or down-direction should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

JOINTS (CODEJLN)

Coverage consists of linear joints.

SPATIAL THEME (FILENAME): Linear Joints (CODEJLN)
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODEJLN.AAT (ArcInfo), CODEJLN.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 14

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODEJLN_*	B (Binary)	4	5	-
CODEJLN_ID*	B (Binary)	4	5	-
JLN_IDX	I (Integer)	6	6	-
JLN_SEG_N	I (Integer)	3	3	-
JLN_SEG_T	I (Integer)	2	2	-
JLN_TYPE	I (Integer)	2	2	-
JLN_LT	I (Integer)	3	3	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

JLN_IDX A unique sequential identification number for each joint arc. The field values ranges from 1 to n, where n is the number of joint arcs in the coverage/theme.

JLN_SEG_N A sequential number assigned to each arc segment of a segmented joint. All arc segments of a joint must be continuous and have a common JLN_IDX number. Segment numbers are assigned starting at either end of the continuous joint. A value of 1 is assigned to the 'starting' arc segment. The next adjacent arc is assigned a value of 2 and so on to the nth arc segment, where n is the total number of arc segments that comprise that joint. A value of 0 may be is assigned to all arcs if 'conditions' justify so.

JLN_SEG_T A code value that designates the positional accuracy and/or concealment of a joint arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

JLN_SEG_T Code Value List

1	known or certain
2	approximate
3	concealed
4	queried

JLN_SEG_T Code Value List (cont.)

5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried

JLN_TYPE A code value used to differentiate joint type, if denoted. Refer to the geologic map legend for graphical representation of joints as well as the accompanying map notes and/or report on jointing and jount types.

JLN_TYPE Code Value List

1	joint

JLN_LT A code value for graphical line type representation of a joint arc segment. The code value is derived from the segment type (JLN_SEG_T , see field description above) and joint type (JLN_TYPE, see field description above). The code value is calculated by multiplying the JLN_TYPE value by 10, then adding the JLN_SEG_T value to the sum.

JLN_LT Code Value List

11	joint, known or certain
12	joint, approximate
13	joint, concealed
14	joint, queried
15	joint, approximate, queried
16	joint, concealed, queried
17	joint, inferred
18	joint, inferred, queried

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

None.

GEOLOGIC CONTOURS and OTHER GEOLOGIC LINES (CODELN#)

Coverage consists of geologic contours and 'other' miscellaneous geologic lines.

SPATIAL THEME (FILENAME): Geologic Contours and Lines (CODELN#*)*
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODELN#.AAT (ArcInfo), CODELN#.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 16

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODELN#_*	B (Binary)	4	5	-
CODELN#_ID*	B (Binary)	4	5	-
LN_IDX	I (Integer)	6	6	-
LN_SEG_N	I (Integer)	3	3	-
LN_SEG_T	I (Integer)	2	2	-
LN_TYPE	I (Integer)	2	2	-
LN_LT	I (Integer)	3	3	-
LN_ELEV_FT	I (Integer)	6	6	-
LN_ELEV_M	I (Integer)	6	6	-
LN_NOTE	C (Character)	254	254	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

LN_IDX A unique sequential identification number for each arc. The field values ranges from 1 to n, where n is the number of arcs in the coverage/theme.

LN_SEG_N A sequential number assigned to each arc segment of a segmented continuos line. All arc segments of a continuos line must have a common LN#_IDX number. Segment numbers are assigned starting at either end of the arc. A value of 1 is assigned to the 'starting' arc segment. The next adjacent arc is assigned a value of 2 and so on to the nth arc segment, where n is the total number of arc segments that continuos line. A value of 0 may be is assigned to all arcs if 'conditions' justify so.

LN_SEG_T A code value that designates the positional accuracy and/or concealment of an arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

LN_SEG_T Code Value List

1	known or certain
2	approximate

LN_SEG_T Code Value List (cont.)

3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried

LN_TYPE A code value used to differentiate line type. Refer to the geologic map legend for graphical representation of applicable geologic lines as well as the accompanying map notes and/or report.

LN_TYPE Code Value List

1	structure contour line
3	paleotopographic contour line
4	isopach line
5	unconformity
6	paleoshoreline
7	subsurface fold
8	subsurface fault
9	lineament
10	stratigraphic section line
11	escarpment
12	resistant bed
13	conspicuous bed

LN_LT A code value for graphical line type representation of a line arc segment. The code value is derived from the segment type (LN_SEG_T , see field description above) and line type (LN_TYPE, see field description above). The code value is calculated by multiplying the LN_TYPE value by 10, then adding the LN_SEG_T value to the sum.

LN_LT Code Value List

11	structure contour line, known or certain
12	structure contour line, approximate
13	structure contour line, concealed
14	structure contour line, queried
15	structure contour line, approximate, queried
16	structure contour line, concealed, queried
17	structure contour line, inferred
18	structure contour line, inferred, queried
21	paleotopographic contour line, known or certain
22	paleotopographic contour line, approximate
23	paleotopographic contour line, concealed
24	paleotopographic contour line, queried
25	paleotopographic contour line, approximate, queried
26	paleotopographic contour line, concealed, queried
27	paleotopographic contour line, inferred
28	paleotopographic contour line, inferred, queried
31	isopach line, known or certain
32	isopach line, approximate
33	isopach line, concealed
34	isopach line, queried

LN_LT Code Value List (cont.)

35	isopach line, approximate, queried
36	isopach line, concealed, queried
37	isopach line, inferred
38	isopach line, inferred, queried
41	unconformity, known or certain
42	unconformity, approximate
43	unconformity, concealed
44	unconformity, queried
45	unconformity, approximate, queried
46	unconformity, concealed, queried
47	unconformity, inferred
48	unconformity, inferred, queried
51	paleoshoreline, known or certain
52	paleoshoreline, approximate
53	paleoshoreline, concealed
54	paleoshoreline, queried
55	paleoshoreline, approximate, queried
56	paleoshoreline, concealed, queried
57	paleoshoreline, inferred
58	paleoshoreline, inferred, queried
61	subsurface fold, known or certain
62	subsurface fold, approximate
64	subsurface fold, queried
65	subsurface fold, approximate, queried
67	subsurface fold, inferred
68	subsurface fold, inferred, queried
71	subsurface fault, known or certain
72	subsurface fault, approximate
74	subsurface fault, queried
75	subsurface fault, approximate, queried
77	subsurface fault, inferred
78	subsurface fault, inferred, queried
81	lineament, known or certain
82	lineament, approximate
83	lineament, concealed
84	lineament, queried
85	lineament, approximate, queried
86	lineament, concealed, queried
87	lineament, inferred
88	lineament, inferred, queried
91	stratigraphic section line, known or certain
92	stratigraphic section line, approximate
93	stratigraphic section line, concealed
94	stratigraphic section line, queried
95	stratigraphic section line, approximate, queried
96	stratigraphic section line, concealed, queried
97	stratigraphic section line, inferred
98	stratigraphic section line, inferred, queried
101	escarpment, known or certain
102	escarpment, approximate

LN_LT Code Value List (cont.)

103 escarpment, concealed
104 escarpment, queried
105 escarpment, approximate, queried
106 escarpment, concealed, queried
107 escarpment, inferred
108 escarpment, inferred, queried
111 resistant bed, known or certain
112 resistant bed, approximate
113 resistant bed, concealed
114 resistant bed, queried
115 resistant bed, approximate, queried
116 resistant bed, concealed, queried
117 resistant bed, inferred
118 resistant bed, inferred, queried
121 conspicuous bed, known or certain
122 conspicuous bed, approximate
123 conspicuous bed, concealed
124 conspicuous bed, queried
125 conspicuous bed, approximate, queried
126 conspicuous bed, concealed, queried
127 conspicuous bed, inferred
128 conspicuous bed, inferred, queried

LN_ELEV_FT Elevation of line in feet. Enter 99999 value if not applicable. (1 ft = 0.3048 m)

LN_ELEV_M Elevation of line in meters. Enter 99999 value if not applicable. (1 m = 3.2808 ft)

LN_NOTE Text notes and remarks on line.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Multiple LN# Themes: Dependent on geologic contour and 'other' line types present on the source map, more than one LN# coverage/theme may be required to capture all geologic line themes. #

denotes a number assigned to a geologic contour or 'other' line coverage/theme name, starting with the number 1.

SENSITIVE POINT FEATURES (CODESPF)

Coverage consists of sensitive geologic features mapped as points.

SPATIAL THEME (FILENAME): Sensitive Geologic Feature Points (CODESPF*)*
THEME DESCRIPTION: Point coverage
TABLE COVERAGE/FILE NAME: CODESPF.PAT (ArcInfo), CODESPF.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 9

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODESPF_*	B (Binary)	4	5	-
CODESPF_ID*	B (Binary)	4	5	-
SPF_IDX	I (Integer)	6	6	-
SPF_TYPE	I (Integer)	2	2	-
SPF_NOTE	C (Character)	254	254	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Point Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

SPF_IDX A unique sequential identification number for sensitive point features. The field values ranges from 1 to n, where n is the number of mine and sensitive point features in the coverage/theme.

SPF_TYPE A code value used to indicate the type of sensitive points. Refer to the geologic map legend for graphical representation of sensitive point features.

SPF_TYPE Code Value List

1	cave
2	hollow
3	skylight
4	tunnel

SPF_NOTE Text note on sensitive point feature.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Point Placement: For many sensitive point feature localities, placement of a digitized point is at the center of the feature's graphical symbol. For sensitive features that do not have a defined graphical symbol center, often non-symmetrical graphic symbols, placement of the digitized point should be at the intersection of symbol lines, if present.

UNIQUE GEOLOGIC POINT FEATURES (CODEUPF)

Coverage consists of unique geologic features mapped as points.

SPATIAL THEME (FILENAME): Unique Geologic Feature Points (CODEUPF*)*
THEME DESCRIPTION: Point coverage
TABLE COVERAGE/FILE NAME: CODEUPF.PAT (ArcInfo), CODEUPF.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 9

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEUPF_*	B (Binary)	4	5	-
CODEUPF_ID*	B (Binary)	4	5	-
UPF_IDX	I (Integer)	6	6	-
UPF_TYPE	I (Integer)	2	2	-
UPF_NOTE	C (Character)	254	254	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Point Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

UPF_IDX A unique sequential identification number for unique point features. The field values ranges from 1 to n, where n is the number of mine and unique point features in the coverage/theme.

UPF_TYPE A code value used to indicate the type of unique points. Refer to the geologic map legend for graphical representation of unique point features.

UPF_TYPE Code Value List

1 natural arch
2 natural bridge
3 rock/boulder
4 natural window
5 cairn
6 collapse structure

UPF_NOTE Text note on unique point feature.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Point Placement: For many unique point feature localities, placement of a digitized point is at the center of the feature's graphical symbol. For unique features that do not have a defined graphical symbol center, often non-symmetrical graphic symbols, placement of the digitized point should be at the intersection of symbol lines, if present.

SURFICIAL GEOLOGIC UNITS (CODESUR)

Coverage consists of surficial geologic units.

SPATIAL THEME (FILENAME): Surficial Geologic Units (CODESUR*)*
THEME DESCRIPTION: Polygon and Arc/line coverage(s)
TABLE COVERAGE/FILE NAME: CODESUR.PAT (ArcInfo), CODESUR.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 10

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODESUR_*	B (Binary)	4	5	-
CODESUR_ID*	B (Binary)	4	5	-
SUR_IDX	I (Integer)	6	6	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Polygon Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

SUR_IDX A unique sequential identification number for each polygon. The field values ranges from 1 to n, where n is the number of polygons in the coverage/theme.

GLG_SYM Age-lithology symbol/code of surficial geologic unit. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below). A value of 'NA' is assigned to polygons that are not areas of surficial geologic units (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

USGS_SYM USGS age-lithology symbol/code of surficial geologic unit. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above). A value of 'NA' is assigned to polygons that are not areas of surficial geologic units (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

GLG_AGE_NO Number used to age-sort geologic units, from youngest (low) to oldest (high). Values assigned to each geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions. A value of 999 is assigned to polygons that are not areas of surficial geologic units (i.e. doughnut holes, see SPECIAL COVERAGE GUIDELINES #1 below).

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. surficial geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool
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SPECIAL COVERAGE GUIDELINES:

1.) Non-Applicable Polygons (Doughnut Holes): Polygons within the CODESUR coverage/theme that are bounded by one or more surficial geologic unit polygons and are not surficial geologic units (i.e. doughnut holes) are assigned a GLG_SYM, USGS_SYM and HELP_ID field (see field descriptions above) value of 'NA', and a GLG_AGE_NO field (see field description above) value of 999.

SURFICIAL GEOLOGIC CONTACTS/BOUNDARIES (CODESUR/CODESURA)

Coverage consists of surficial geologic contact arcs and map boundary.

SPATIAL THEME (FILENAME): Surficial Geologic Unit Boundaries/Contacts (CODESUR/ArcInfo), (CODESURA/ArcView)
THEME DESCRIPTION: Arc/line coverage
TABLE COVERAGE/FILE NAME: CODESUR.AAT (ArcInfo), CODESURA.DBF (ArcView)
TABLE FORMAT: INFO .AAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 11

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
FNODE_*	B (Binary)	4	5	-
TNODE_*	B (Binary)	4	5	-
LPOLY_*	B (Binary)	4	5	-
RPOLY_*	B (Binary)	4	5	-
LENGTH*	F (Float)	4	18	5
CODESURA_*	B (Binary)	4	5	-
CODESURA_ID*	B (Binary)	4	5	-
SURCNT_IDX	I (Integer)	6	6	-
SURCNT_TYP	I (Integer)	3	3	-
FLTCNT	C (Character)	1	1	-
GMAP_ID	I (Integer)	6	6	-

* See Standard ArcInfo Arc Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

SURCNT_IDX A unique sequential identification number for each surficial contact/map boundary arc. The field values ranges from 1 to n, where n is the number of arcs in the coverage/theme.

SURCNT_TYPE A code value that designates the positional accuracy and/or concealment of a surficial contact/map boundary arc. Refer to the geologic map legend for graphical representation of line accuracy and concealment.

SURCNT_TYP Code Value List

1	known or certain
2	approximate
3	concealed
4	queried
5	approximate, queried
6	concealed, queried
7	inferred
8	inferred, queried
9	gradational
10	quadrangle boundary
11	extent/map boundary

SURCNT_TYP Code Value List (cont.)

12	water/shoreline
13	water/shoreline, approximate
14	ice/glacial
15	ice/glacial approximate

FLTCNT Designates surficial geologic contact arcs that are also fault arcs. Contact arc segments that are also fault arcs (FLTCNT = 'Y') are present in both the surficial geologic contact (CODESUR/CODESURA) and fault (CODEFLT) themes.

FLTCNT Code List

Y	Yes, the contact is also a fault
N	No, the contact is not also a fault

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

SPECIAL COVERAGE GUIDELINES:

1.) Contact/Fault Arcs in Multiple Themes: Contact arcs that are also fault arcs (FLTCNT = 'Y', see FLTCNT field description above) are present in both the geologic contact/boundaries (CODESUR/CODESURA) and fault (CODEFLT) themes.

2.) Contact/Fault Arc Directionality: Contact/fault arcs (FLTCNT = 'Y', see FLTCNT field description above) are captured with the down-thrown fault block, if applicable, on the 'right side' of the arc. The 'right' and 'left' sides of an arc are determined from 'starting' at the arc's 'from node' (FNODE_) and moving to the arc's 'to node' (TNODE_). Thus, the down-thrown fault-block should be the arc segment's RPOLY_. See Standard ArcInfo Arc Attribute Fields section for FNODE_, TNODE_ and RPOLY_ definitions/descriptions.

MEASURED UNIT THICKNESS (CODEMUT)

Coverage consists of measured unit thickness point localities.

SPATIAL THEME (FILENAME): Measured Unit Thickness (CODEMUT*)*
THEME DESCRIPTION: Point coverage
TABLE COVERAGE/FILE NAME: CODEMUT.PAT (ArcInfo), CODEMUT.DBF (ArcView)
TABLE FORMAT: INFO .PAT (ArcInfo), dBase IV .DBF (ArcView)
NUMBER OF ATTRIBUTE FIELDS: 14

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
AREA*	B (Binary)	8	18	5
PERIMETER*	B (Binary)	8	18	5
CODEMUT_*	B (Binary)	4	5	-
CODEMUT_ID*	B (Binary)	4	5	-
MUT_IDX	I (Integer)	6	6	-
MUT_TYPE	I (Integer)	2	2	-
GLG_SYM	C (Character)	12	12	-
USGS_SYM	C (Character)	12	12	-
GLG_AGE_NO	N (Number)	7	7	4
MUT_UT_FT	N (Number)	6	6	3
MUT_UT_M	N (Number)	6	6	3
MUT_NOTE	C (Character)	254	254	-
GMAP_ID	I (Integer)	6	6	-
HELP_ID	C (Character)	12	12	-

* See Standard ArcInfo Point Attribute Fields.

ATTRIBUTE FIELD DESCRIPTIONS:

MUT_IDX A unique sequential identification number for each measurement locality. The field values ranges from 1 to n, where n is the number of measured unit thickness localities.

MUT_TYPE A code value used to indicate the type of measured unit feature.

MUT_TYPE Code Value List

1	coal bed thickness
2	volcanic ash bed/layer thickness
3	ore bode thickness

GLG_SYM Age-lithology symbol/code of geologic unit measured unit point feature is located within. The code usually is identical to the USGS_SYM age-lithology symbol/code (see field description below).

USGS_SYM USGS age-lithology symbol/code of geologic unit measured unit point feature is located within. The code usually is identical to the GLG_SYM age-lithology symbol/code (see field description above).

GLG_AGE_NO Number used to age-sort geologic map units, from youngest (low) to oldest (high). Values assigned to each point geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions.

MUT_UT_FT Thickness of unit in feet. (1 ft = 0.3048 m)

MUT_UT_M Thickness of unit in meters. (1 m = 3.2808 ft)

MUT_NOTE Text note on measurement/unit.

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

HELP_ID A text field used to establish a connection to a Windows Help File to display textual and/or graphical information, information derived from source map notes, legend, figures, reports and/or additional sources. Information presented relates to either a specific map feature, a class or group of map features (i.e. geologic units), and/or the coverage/theme. The HELP_ID 'variable' is 'passed' to the Help File when a map feature is 'selected' using a NPS Theme Manager tool.

SPECIAL COVERAGE GUIDELINES:

1.) Point Placement: For measured unit thickness localities, placement of a digitized point is at the center of the localities graphical symbol.

Additional Themes

Other themes, derived from new GRI digital map projects, are likely to follow.

Accessory Data Files

Additional data on unit lithology and source map information are included in two look-up tables that are related to map coverages through a primary or secondary key field.

TABLE COVERAGE/FILE NAME: CODEGLG1.INF (ArcInfo), CODEGLG1.DBF (ArcView)
TABLE FORMAT: INFO table (ArcInfo), dBase IV (ArcView)
NUMBER OF FIELDS: 11

ATTRIBUTE FIELD DEFINITIONS:

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
GLG_SYM	C (Character)	12	12	-
GLG_NAME	C (Character)	100	100	-
G_REL_AGE	C (Character)	5	5	-
G_SSCR_TXT	C (Character)	6	6	-
GLG_AGE_NO	N (Number)	7	7	4
G_AGE_TXT	C (Character)	50	50	-
G_MJ_LITH	C (Character)	3	3	-
G_LITH_ID	I (Integer)	10	10	-
G_LITH_TXT	C (Character)	254	254	-
G_NOTE_TXT	C (Character)	254	254	-
GMAP_SRC	C (Character)	100	100	-

ATTRIBUTE FIELD DESCRIPTIONS:

GLG_SYM Age-lithology symbol/code of geologic unit. The field is the primary key used to relate the CODEGLG1.INF or CODEGLG1.DBF file to the geologic unit (CODEGLG) and other themes with a GLG_SYM field that possess less descriptive unit lithology data.

GLG_NAME Name of geologic unit.

G_REL_AGE Relative age of geologic unit.

G_SSCR_TXT Subscript from the map symbol.

GLG_AGE_NO Number used to age-sort geologic units, from youngest (low) to oldest (high). Values assigned to each geologic unit is dependent on the geologic units that comprise the compiled NPS Unit geologic map. Subdivisions of geologic units is often denoted by assigning the same integer component of a decimal number to each division of the geologic unit and using the decimal fraction to differentiate the subdivisions.

G_AGE_TXT Geologic time period text of geologic/lithologic unit.

G_MJ_LITH Lithology type of geologic/lithologic unit.

G_MJ_LITH Code Value List
EXT extrusive igneous
INT intrusive igneous

G_MJ_LITH Code Value List (cont.)

MAS	metamorphic and sedimentary
MET	metamorphic
SED	sedimentary
VAS	volcanic and sedimentary
UNC	unconsolidated

G_LITH_ID (GMDM Lith_id) Code of lithology type. Derived from USGS Geology Data Model.

G_LITH_TXT Textual description of unit lithology.

G_NOTE_TXT Descriptive notes about the geologic/lithologic unit.

GMAP_SRC Source map(s) GMAP_ID values.

Example record from CODEGLG1.INF or CODEGLG1.DBF

GLG_SYM = Qvba(pc)
GLG_NAME = Basaltic Andesite of Puny Creek
G_REL_AGE = Q
G_SSCR_TXT = vba
GLG_AGE_NO = 1.00
G_AGE_TXT = Holocene
G_MJ_LITH = EXT
G_LITH_ID = 71
G_LITH_TXT = basaltic andesite flows
G_NOTE_TXT = volcanic lava flows with interbedded soil horizons
GMAP_SRC = 1187, 1188, 1189, 1191

TABLE COVERAGE/FILE NAME: CODEMAP.INF (ArcInfo), CODEMAP.DBF (ArcView)
TABLE FORMAT: INFO table (ArcInfo), dBase IV (ArcView)
NUMBER OF FIELDS: 17

FIELD NAME	TYPE	INPUT WIDTH	OUTPUT WIDTH	DECIMAL PLACES
GMAP_ID	I (Integer)	6	6	-
GMAP_CODE	C (Character)	4	4	-
GMAP_ABBRV	C (Character)	150	150	-
GMAP_YEAR	I (Integer)	4	4	-
GMAP_AUTH	C (Character)	150	150	-
GMAP_ORG	C (Character)	100	100	-.
GMAP_TITLE	C (Character)	254	254	-
GMAP_SER	C (Character)	40	40	-
GMAP_SCALE	I (Integer)	6	6	-
GMAP_PROJ	C (Character)	100	100	-.
GMAP_REF	C (Character)	254	254	-
GMAP_DESC	C (Character)	254	254	-
GMAP_XMAX	N (Number)	9	9	6
GMAP_XMIN	N (Number)	9	9	6
GMAP_YMAX	N (Number)	9	9	6
GMAP_YMIN	N (Number)	9	9	6
GMAP_SRC	C (Character)	254	254	-

FIELD DESCRIPTIONS/COMMENTS:

GMAP_ID Unique integer value assigned to the source map in the GMAP_ID database. The integer value assigned is the map's record number in the GMAP_ID database. The field is a 'key' in a one-to-one relationship with the GMAP_ID database, and the CODEMAP.INF (Info) and CODEMAP.DBF tables derived from the GMAP_ID database. Information contained within these files relates; NPS unit(s) the map is relevant to, map alpha code, map name abbreviation, year of map publication, author(s) of the map, originator or publisher of the map, complete map title, map series number, map scale, map projection, complete map citation listing in USGS format, map description, bounding coordinates of the map extent, and a list of the map's source(s).

GMAP_CODE Unique 4-letter alpha code assigned to a map. For compiled NPS unit digital geologic maps this code is often the NPS Unit's alpha code.

GMAP_ABBRV Abbreviation of map title. Abbreviation often includes map or quadrangle name and interpretation technique (e.g., Preliminary, Photogeologic) and/or a map emphasize term on the distribution of specific materials (e.g., Surficial, Bedrock).

GMAP_YEAR Year of map compilation or publication.

GMAP_AUTH Map author(s) and compiler(s). For digital maps, digital compiler(s) and digitizer(s) may also be cited.

GMAP_ORG Abbreviation of organization that compiled and/or published map.

GMAP_TITLE Published map title.

GMAP_SER Map series and/or organizational identifier (e.g., USGS GQ-1516).

GMAP_SCALE Source map scale denominator.

GMAP_PROJ Name or description of map projection with projection datum.

GMAP_REF Complete map citation in USGS style; author(s), year, title, originator, series number, scale.

GMAP_DESC Brief description of map extent, interpretation methodology and/or emphasize.

GMAP_XMAX Western limit (longitude) of map extent in decimal degrees.

GMAP_XMIN Eastern limit (longitude) of map extent in decimal degrees.

GMAP_YMAX Northern limit (latitude)of map extent in decimal degrees.

GMAP_XMIN Southern limit (latitude) of map extent in decimal degrees.

GMAP_SRC Source map(s) with organization and map series number (i.e. USGS GQ-1402, USGS GQ-1568).

Example record for the Geologic map of Rocky Mountain National Park and Vicinity, Colorado. The 4-letter NPS alpha code for Rocky Mountain NP is ROMO.

ROMOMAP.INF or ROMOMAP.DBF

GMAP_ID = 144
GMAP_CODE = ROMO
GMAP_ABBRV = Rocky Mountain NP
GMAP_YEAR = 1990
GMAP_AUTH = Braddock, William A., and Cole, James C.
GMAP_ORG = USGS
GMAP_TITLE = Geologic map of Rocky Mountain National Park and Vicinity, Colorado
GMAP_SER = I-1973
GMAP_SCALE = 50000
GMAP_PROJ = Geographic
GMAP_REF = Braddock, William A., and Cole, James C., 1990, Geologic map of Rocky Mountain National Park and Vicinity, Colorado, USGS, I-1973, 1:50,000 scale
GMAP_DESC = Geologic map of Rocky Mountain National Park and adjacent vicinity.
GMAP_XMAX = -105.958333
GMAP_XMIN = -105.458333
GMAP_YMAX = 40.566666
GMAP_YMIN = 40.125000
GMAP_SRC = see published USGS non-digital (paper) map.

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Johnson, Bruce R., Boyan Brodaric, and Gary L. Raines, 1998, Draft Digital Geologic Map Data Model, Version 4.2: American Assoc. of State Geologists/U.S. Geological Survey Geologic Map Data Model Working Group, May 19, 1998. <http://geology.usgs.gov/dm/>

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